Bay-Friendly Gardening

From your backyard to the Bay

The Bay-Friendly Gardening Program was developed to encourage residents to make environmentally friendly gardening choices. It is not a particular style, but an approach that works with nature to reduce waste and protect the watersheds of the San Francisco Bay. Bay-Friendly Gardening is a program of the Alameda County Waste Management Authority and Source Reduction & Recycling Board, also known as StopWaste.Org.

Resources available to Alameda County residents through the Bay-Friendly Gardening Program include:

- Bay-Friendly Gardening Workshop Series
- Bay-Friendly Garden Tour
- Bay-Friendly Garden Registration
- Master Composter Training
- Bay-Friendly Partner Nurseries
- Low-Cost Compost Bins
- Compost Information Hotline

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Visit www.BayFriendly.org for more information, or call the Compost Info Hotline at (510) 444-SOIL (7645).

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East Bay Garden Profiles

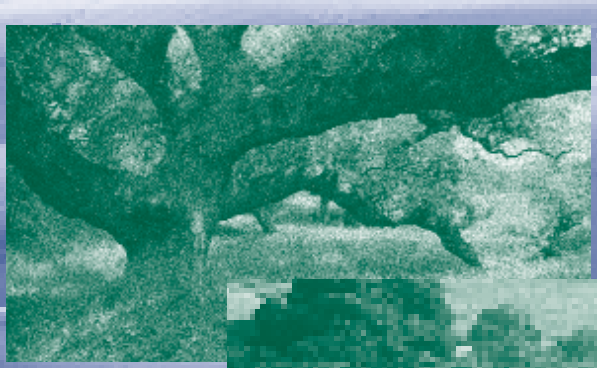
Gardening Tips

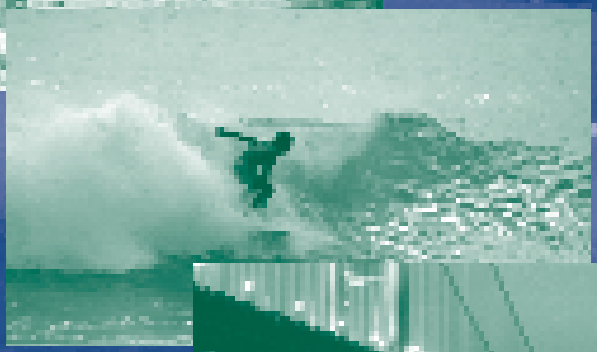
Gardening tips have been gathered from local landscapers, organizations, books and other resources. Tips of all sorts can be found in each chapter.

Words from the Wise:

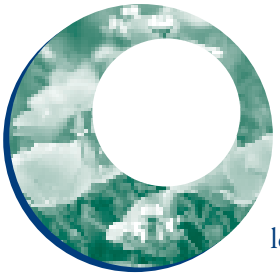
Host gardeners from past Bay-Friendly Garden Tours share insights from their gardening experiences. Look for these anecdotes scattered throughout the guide.

We live in an





amazing place.



In the edge of a continent, bounded by deserts and mountains, California is a land of spectacular natural beauty. It is also a land of extremes — within our borders are the highest and lowest points in the lower 48 states.

California also boasts a Mediterranean climate. A handful of places — regions that lie between 30 and 40 degrees latitude on the western limits of a continent — share California's exceptional climate. The Mediterranean basin, the Western Cape of Africa, Central Chile, southwest and south Australia, and much of the state of California: these are the only areas on the planet that experience our mild temperatures. Furthermore, each of these regions is defined for half the year by the absence of rain.

The Watershed of the San Francisco Bay

Seventy-five percent of California's annual precipitation falls north of Sacramento. Some of this area — 40 percent of the state — lies in the watershed of the San Francisco Bay. Two rivers, the Sacramento and San Joaquin, are the main channels of a system that covers 60,000 square miles.

Immediately surrounding the bay are many smaller watersheds — the hills and valleys of our towns and neighborhoods. The Sausal Creek watershed in Oakland covers just over four square miles; Alameda Creek drains an area of almost 700 square miles, carrying water from the inland cities of Livermore, Dublin, and Pleasanton into the bay.

The bay is a great mixing ground that is tremendously fertile and full of life. Fresh water meets salt water in its northeastern reaches; drifting phytoplankton form the base of a complex food web that includes hundreds of thousands of resident and migratory birds. The bay is also a repository for many abiotic elements — including urban runoff.

Wherever there are surfaces that water can not penetrate, such as rooftops, driveways, streets, and parking lots, rain quickly runs off. It picks up whatever it flows across — litter, motor oil, sediment, pesticides and fertilizers, plant debris — and carries it to nearby storm drains, which lead to our creeks, which empty into the bay.

The bay contains high levels of some pesticides, including diazinon. All Bay Area creeks have been listed by the EPA as impaired by diazinon, which is toxic to birds, mammals, honey bees, and other beneficial insects.

Diazinon is highly toxic to freshwater fish and invertebrates following acute exposure. A typical 1,000-square-foot urban application of diazinon contains enough active ingredient to pollute 170 million gallons of fresh water.

The ubiquity of diazinon in Bay Area waterways illustrates the impact that gardeners can have in harming or protecting our natural resources. Because of its toxicity, diazinon is being phased out of the consumer market, but there are dozens of other equally harmful products available to take its place. Through changing our gardening practices, many of the contaminants in stormwater runoff could be eliminated. Just as important, solid waste can also be significantly reduced.

Watersheds and Wastesheds — What's the Connection?

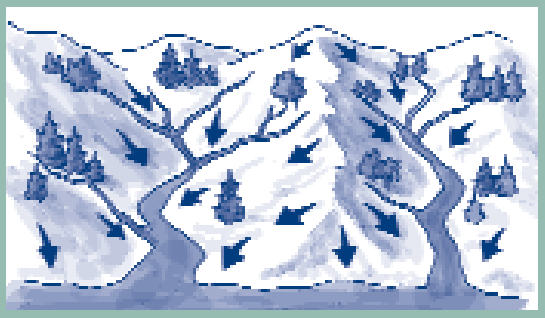
The passage of AB939 in 1989 set a statewide goal of reducing California's waste stream in half by the year 2000. (As of 2004, waste diversion statewide has reached 48 percent.) Some counties set local goals to reach beyond the 50 percent. For example, in 1990 the voters of Alameda County set the ambitious goal to reduce waste by a total of 75 percent by the year 2010. To achieve this, county residents will have to not only reduce the quantity of materials they discard, but also divert more of them — that is, reuse and recycle valuable materials, instead of throwing them away.

In Alameda County, nineteen percent of the waste stream is food and plant debris (that's 294,110 tons). Food, at 12 percent, is the single largest category of landfilled waste in Alameda County. By recycling these materials at home — composting kitchen scraps, converting plant trimmings into mulch, leaving grass clippings on the lawn — we keep valuable resources out of our landfills and we replenish the soil.

Standard gardening practice is to remove all plant debris off-site, to landfills or large compost facilities, which effectively mines our soils of organic matter. Urban soils have often been compacted, eroded, and so depleted that they are no longer able to function naturally. By keeping plant debris and fruit and vegetable trimmings on-site in the form of mulch and compost, we restore the soil's ability to absorb water or filter pollutants. Returning organic matter to the soil is the link between protecting our watersheds and conserving landfill space.

What Is a Watershed?

A watershed is the area of land that water flows across on its way to a creek, river, lake, bay, or ocean.



What Is a Wasteshed?

A wasteshed is the area of land from which all of the "streams" of refuse — from individuals and their communities — flow into the same landfill.

Introducing Bay-Friendly Gardening

Retaining organic materials on site is one of the most important practices a gardener can engage in. There are also many other ways that gardeners can protect and care for the environment both near and far.

The Bay-Friendly Gardening program was developed to encourage residents to make environmentally friendly gardening choices. Bay-Friendly Gardeners work with nature to reduce waste and protect the local creeks, waterways, and watersheds of the San Francisco Bay.

Bay-Friendly Gardening mimics natural systems, which recycle everything — water, debris, and nutrients — endlessly. It pays attention to climate and local conditions and uses plants that are adapted to those conditions. It follows maintenance practices that support the goals of conserving resources and reducing waste. This approach to gardening:

- Landscapes locally
- Landscapes for less to the landfill
- Nurtures soil health
- Protects air and water quality
- Conserves water
- Conserves energy
- Provides wildlife habitat

Bay-Friendly Gardening does not advocate a particular style of gardening. Bay-Friendly Gardens aren't a mold you have to fit into — they offer endless opportunities, from backyard wildlife gardens and native plant communities to vegetable gardens, flower beds, and more.

The Benefits of Bay-Friendly Gardening

Because it works with nature, rather than against it, Bay-Friendly Gardening simplifies garden care. Using fewer resources, such as water and fertilizer, can mean less maintenance. And because it emphasizes natural gardening techniques, Bay-Friendly Gardening offers a way to make our communities healthier, safer places.

Research has shown that children are particularly vulnerable to contaminants in the environment. They are also especially open to the opportunities for discovery and play that a garden can provide. Inviting children to go for a snail hunt on summer nights is a safer way to eliminate the pest than setting out poison.

It has also been shown that looking out on a garden helps hospital patients recover more quickly. Even when glimpsed from a moving car, natural scenery soothes the viewer. Whether you want an attractive yard to view from your home or a place where you can get your hands dirty, growing a Bay-Friendly Garden can help make you a healthier individual and help you make your community a healthier place.

A Bay-Friendly Garden:


Builds Healthy Soil


Reduces Waste in the Garden


Conserves Water


Creates Wildlife Habitat


Protects Local Watersheds and the Bay


Contributes to a Healthy Community


Saves Energy

In the following pages, you will find guidelines for a variety of Bay-Friendly Gardening practices. They cover all the main activities a gardener undertakes — planning the garden, choosing plants, caring for the soil, planting, watering, pruning, and so on. The icons shown above appear throughout this handbook, to signal the benefits offered by every gardening practice described. For a detailed list of the practices, see pages 10-11.

Putting Bay-Friendly Practices into Place

Incorporating Bay-Friendly practices into your garden does not have to be difficult. In fact, many Bay-Friendly techniques can make gardening chores less of a chore. Using mulch for example, helps to build healthy soil, reduce waste and conserve water, but it can also save time spent weeding and watering in the garden.

The following checklist can be used as a guiding tool for incorporating Bay-Friendly practices.

You may also find that your current gardening habits are already Bay-Friendly. You do not need to do all of the following techniques to capture the spirit of Bay-Friendly in your garden. Including even one practice will reap multiple benefits. Take the case of choosing California natives — this practice conserves water by selecting plants adapted to a Mediterranean climate, and creates wildlife habitat by providing food for local wildlife.

Build Healthy Soil 

- Amend soil with compost.
- Prepare garden beds by hand rather than with a tiller.
- Maintain garden beds with little or no tilling.
- Sheet mulch to establish planting areas or pathways, or to control weeds while improving soil.
- Create clearly defined paths and or raised beds to protect soil from compaction.
- Grow cover crops to enrich the soil.

Reduce Waste in the Garden 

- Create and maintain an active compost or worm bin for garden and/or food waste.
- Use your green waste cart for any plant wastes that are difficult to compost on site.
- Use leaves, chipped plant debris, compost, or other organic materials as mulch.
- Minimize plant waste by not overplanting, overwatering, or overfertilizing.
- Minimize pruning by choosing plants that are appropriate for the space.
- Avoid sheared hedges in the garden.
- Leave clippings on the lawn after mowing.
- Use recycled or salvaged products for artistic or functional purposes.

Conserve Water 

- Emphasize Mediterranean climate or California native plants. (Try to use these plants for at least half of your garden area.)
- Group plants in the landscape by water needs.
- Minimize or eliminate lawn area.
- Install efficient irrigation (drip, timers, soaker hoses, etc.).
- Water according to plants' needs, not just on a fixed schedule.
- Use mulch in garden beds.
- Install a rainwater collection or gray water system.

Create Wildlife Habitat 

- Provide food for wildlife with a variety of plants that flower and set fruit at different times of year.
- Provide water with a small pond, bird bath, or water dish.
- Create year-round protective cover with a planting of evergreen trees/shrubs, logs, rocks, or brush pile.
- Diversify your garden structure with layers of ground covers, herbaceous vegetation (non-woody) and/or grasses, shrubs of various heights, and trees.
- Leave some areas of the garden somewhat untidy — let flowers go to seed to provide food for birds, and leave dead leaves and stalks to shelter over-wintering insects.
- Feature native plants. (Plant more than 50% of your garden with California natives.)

Protect Local Watersheds and the Bay 

- For patios, driveways, or other hard surfaces, choose permeable materials that allow water to soak in rather than run off.
- Terrace steep slopes to reduce rainwater run-off and prevent erosion.
- Cover nearly all soil with mulch or plants.
- Avoid the use of synthetic fertilizers.
- Avoid the use of plants considered invasive in local wildlands (see page 33).

Contribute to a Healthy Community 

- Use an integrated approach for controlling weeds, insect pests and diseases with least toxic controls used first for safety of children, pets and wildlife.
- Tolerate pests as much as possible.
- Select disease resistant varieties of plants.
- Include plants that attract beneficial insects in the landscape.
- Grow vegetables organically for food and enjoyment.
- Plan outdoor lighting that is dim or directed downwards to minimize light pollution.
- Use hand or electric tools instead of gas-powered tools.
- Consider and control potential neighborhood hazards — including fire awareness, weed seed dispersement, and rodent habitat.

Save Energy 

- Place trees and shrubs to reduce energy requirements. For example, plant deciduous trees on the west side of the house to provide shade during the summer and allow sunlight to warm the house in the winter.
- Shade parking asphalt areas and air conditioners, if applicable.
- Select local garden products and suppliers.
- Choose outdoor lights that are energy efficient or solar.
- Select pumps for water features that are solar powered or energy efficient.
- Include space in the garden for a clothesline.

Gardening Locally

Bay-Friendly Gardening recognizes that what we do in our yards has impacts on pesticide loads in the San Francisco Bay and capacity at the Altamont Landfill. One way to reduce such impacts is to garden locally — that is, with an awareness of local conditions and the land's natural inhabitants.

As a part of this, Bay-Friendly Gardening uses natural plant communities as models for the garden. Plant communities are in large part determined by the conditions that a gardener needs to consider when selecting plants — such as soil, light, moisture, drainage, and exposure — so plant communities can provide inspiration for how to group plants in the garden and what plants to choose. Whether filled with native plants or with exotics that do well in these settings, any garden can have a version of all of the following California plant communities.

East Bay gardeners Gail Schino, Grant Minix, and Mike Geltz have individual approaches to the concept of *Gardening Locally.* Gail Schino takes inspiration from nearby open spaces to create plant communities in her San Leandro garden. Grant Minix and Mike Geltz rely on local resources to transform an urban lot in Oakland. See garden profiles on pages 16-17.

Coastal Prairie and Valley Grassland are distinguished by their proximity to the bay. Valley grassland occurs on the inland side of the East Bay hills; coastal prairie is close to the water. Both are a rich complex of perennial bunchgrasses interspersed with perennial and annual wildflowers. Prairie and grassland species are adapted to full sun and summer drought; they will accept a variety of soils.

PHOTO: RICHARD ROLLINS

Valley and Foothill Woodland includes open oak woodlands, which have a grassy understory; dense oak groves crowded with lower shrubs and herbs; and shady bay laurel woods. Oak woodlands are summer-dry environments; the plants of denser woodlands will take moister conditions and soils high in organic matter. Many understory woodland plants are shade tolerant.

PHOTO: ELLEN ZAGORY

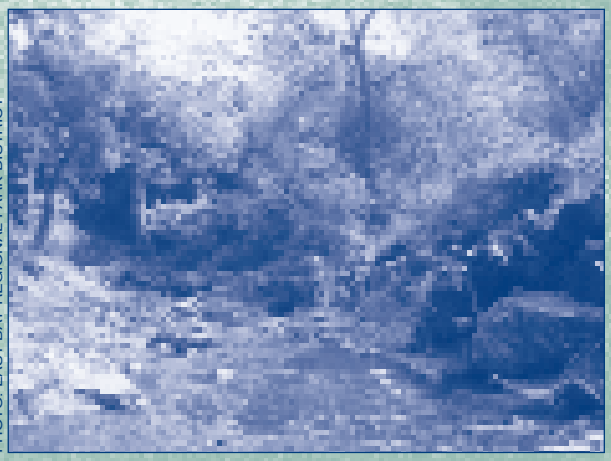


PHOTO: EAST BAY REGIONAL PARK DISTRICT

Riparian Woodland

is structured like other woodlands, with an overstory of tall trees and, in this case, a dense, lush understory of shrubs and smaller plants. This creekside plant community depends on year-round moisture; some riparian plants are sun-loving, others are shade tolerant. In the garden they prefer loose soils.

PHOTO: EAST BAY REGIONAL PARK DISTRICT

Redwood Forest

Redwoods are rightly famous, and the Oakland and Berkeley hills are still graced with them. A distinctive group of understory species is adapted to the deep shade of the redwood groves.

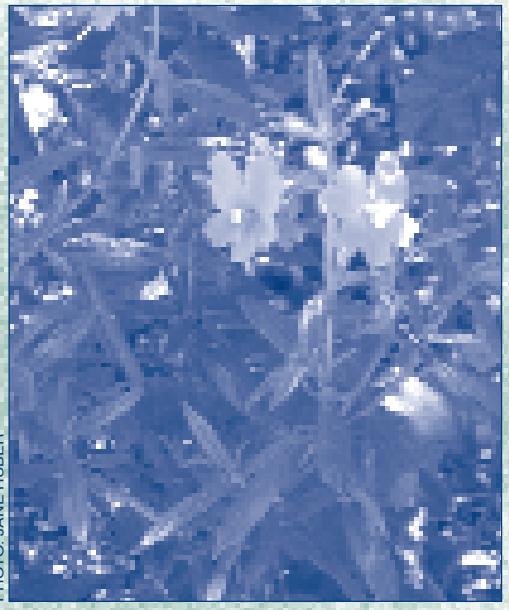


PHOTO: JANE HUBER

Northern Coastal Scrub

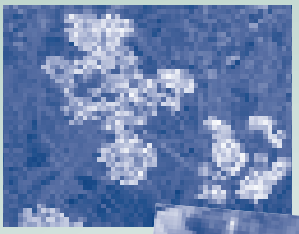
also lies close to the coast and along parts of the bay. In addition to grasses and other herbaceous plants, this community also has a shrub layer. Plants in this community are adapted to exposed locations and at least a bit of fog.

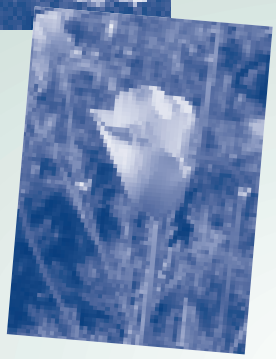
Common Plants for Bay Area Plant Communities

Following are selected lists of representative species for the most common plant communities in the Bay Area. Understory plants are suggested for the Redwood Forest and Woodland communities — that is, an assumption has been made that there are existing redwoods, oaks or other trees providing the inspiration and environment for your chosen plant community.

Coastal Prairie and Valley Grassland

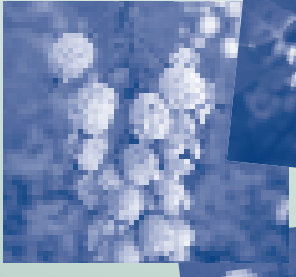
Achillea millefolim	Yarrow
Calamagrostis nutkaensis	Reed grass
Calochortus luteus	Golden mariposa
Carex tumulicola	Dwarf sedge
Danthonia californica	Wild oat grass
Deschampsia caespitosa holciformis	Hair grass
Dichelostemma capitatum	Bluedicks
Eschscholzia californica	California poppy
Festuca idahoensis	Fescue bunchgrass
Iris douglasiana	Douglas iris
Nasella lepida, N. pulchra	Needlegrass, Purple needlegrass
Pteridium aquilinum pubescens	Bracken fern
Sidalcea malviflora	Checkerbloom
Sisyrinchium bellum	Blue-eyed grass
Solidago californica	California goldenrod
Triteleia laxa	Ithuriel's spear
Wyethia angustifolia	Mule's ears

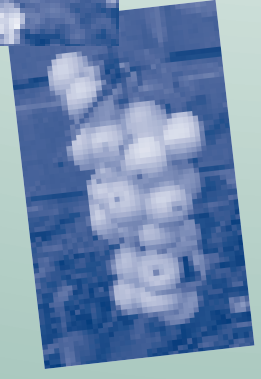




Valley and Foothill Woodland

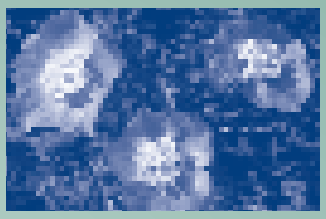
Achillea millefolium	Yarrow
Arctostaphylos	Manzanita (some species more shade tolerant than others)
Ceanothus	California lilac (some species shade tolerant)
Cistus	Rockrose
Correa	Australian fuchsia 'Carmine Bells'
Festuca californica	California fescue
Heteromeles arbutifolia	Toyon
Holodiscus discolor	Ocean Spray
Iris douglasiana	Douglas iris
Keckiella cordifolia	Heartleaf keckiella
Lepechinia	Pitcher sage
Leymus condensatus 'Canyon Prince'	Giant wild rye
Mahonia aquifolium	Oregon grape
Mimulus aurantiacus, M. bifidus, M. puniceus	Monkeyflower
Muhlenbergia rigens	Deer grass
Rhamnus californica	Coffeeberry
Ribes sanguineum, R speciosum	Pink-flowering currant, Gooseberry
Ribes viburnifolium	Catalina perfume
Salvia spathacea	Hummingbird sage
Satureja douglasii	Yerba Buena
Symphoricarpos sp.	Snowberry
Vitis californica	Wild grape





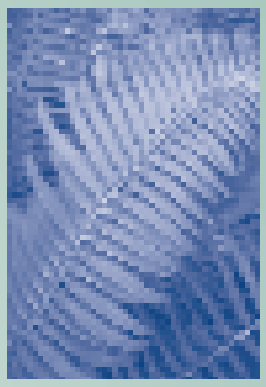
Riparian Woodland

Aristolochia californica	Dutchman's pipe
Athyrium filix-femina	Lady fern
Carex species	Dwarf sedge
Clematis ligusticifolia	Clematis
Cornus species	Creek Dogwood
Equisetum species	Horsetail
Juncus effuses bruneus	Green rush
Mimulus cardenalis, M. guttatus	Scarlet monkeyflower, Seep Monkeyflower
Oenanthe sarmentosa	Creek parsley
Rosa californica	California rose
Salix species	Red willow
Sisyrinchium californicum	Yellow-eyed grass
Vitis californica	California grape



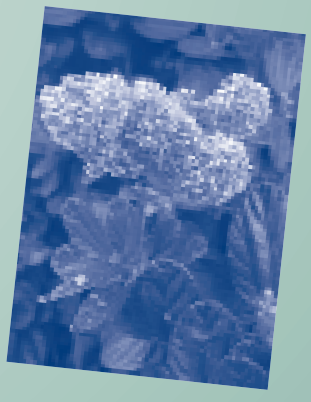
Redwood Forest

Aquilegia formosa	Western columbine
Asarum caudatum	Wild ginger
Carpenteria californica	Bush anemone
Dryopteris sp.	Wood fern
Fragaria vesca ssp. californica	Woodland strawberry
Heuchera maxima, H. micrantha	Coral bells
Myrica californica	Pacific wax myrtle
Polystichum munitum	Western sword fern
Rhamnus californica	Coffeeberry
Ribes sanguineum, R. viburnifolium	Pink-flowering currant, Catalina perfume
Symphoricarpos albus, S. mollis	Snowberry
Vaccinium ovatum	California huckleberry



Northern Coastal Scrub

Arctostaphylos uva-ursi 'Pt. Reyes'	Manzanita
Artemisia californica	Coast sagebrush
Baccharis pilularis var. consanguinea	Coyote brush
Ceanothus gloriosus	Ceanothus
Ceanothus cuneatus	Buckbrush
Cercocarpus betuloides	Mountain mahogany
Chlorogolum pomeridianum	Soap plant
Diplacus aurantiacus	Monkey flower
Epilobium canum	California fuchsia
Heracleum lanatum	Cow parsnip
Heteromeles arbutifolia	Toyon
Lupinus albifrons	Bush lupine
Mimulus aurantiacus	Sticky monkeyflower
Rhamnus californica	Coffeeberry
Salvia melifera	Black sage
Scrophularia californica	Bee plant
Wyethia angustifolia	Mule's ears



Local and Appropriate: Blending Styles in San Leandro

Nestled at the foot of the East Bay hills along the flanks of San Leandro Creek, the Le Brun Park neighborhood of San Leandro was developed in the '50s and '60s. When Gail Schino bought a home there, the landscaping reflected the era in which the house was built. There were "spaceship" junipers — the tall, skinny kind — and camellias in front of all the windows. "They were fifty-year-old trees — I tried to live with them," says Schino. "It wasn't feasible."

Although Schino describes the main gardening model in her neighborhood as "mowers and blowers," she wanted something different. She didn't want to use pesticides, for example, because of her proximity to San Leandro Creek and because she has pets. So she began thinking about plants that can thrive without toxic inputs. And as she walked around nearby Lake Chabot, where the creek originates, she started paying attention to the plants native to her watershed.

To learn more about native plants, Schino made several trips to Yerba Buena Nursery in Woodside, one of the oldest native plant nurseries in the Bay Area. Schino also took several local garden tours. She noticed the work of Michael Thilgen, a landscape architect known for his expertise in sustainable landscaping. "It got so I could recognize his gardens," Schino says, and she decided to hire his company, Four Dimensions Landscape Development. She asked Thilgen to help her create a garden that would be compatible with the oak woodland and creek plant communities bordering her house.

The back of Schino's lot slopes down to San Leandro Creek. Thilgen pulled the ivy blanketing the creek bank and replaced it with a diversity of shrubs and herbs common to creek corridors. To further increase the wildlife value of the garden, Schino and Thilgen built a large pond at the top of the creek bank. Many tree frogs have since moved in, migrating from creekside herbs and trees. Having laid eggs and developed in the pond, the mature frogs — some no more than an inch long — take shelter in the rushes, sedges, scarlet monkeyflower, and tule potato planted beside it.

To keep the ground around the pond moist, as it would be in the wild, Thilgen extended the pond liner beyond the lip of basin. Water seeps out to the fabric's edges and into the surrounding soil. A little farther away, at the corner of the lot under an old, spreading oak, Thilgen planted local natives — snowberry, Douglas iris, California fescue — that, like oaks, don't want summer water.

To take the intense heat of the south-facing front of the house, Thilgen created a prairie. He seeded red fescue, purple needlegrass, and wildflowers in beds on either side of the walkway to the door, bordering them with white yarrow. These sun-lovers can withstand the glare from a large expanse of asphalt where four streets meet in front of Schino's house.

On the warm and sunny southeast side of the house, a chaparral theme prevails. The tangy scent of Cleveland sage entices hummingbirds and bumblebees; ceanothus and manzanita offer fragrance and bloom in early spring.

Low Cost, High Satisfaction: Reuse and Renovation in an Oakland Garden

Grant Minix and Michael Geltz are such good recyclers that their garbage company, Waste Management, gave them a $60 credit and six months' free service. Minix and Geltz take out a single bag of garbage once a month.

The waste-not ethic so evident inside the house has also been put to work outside it, where Minix and Geltz have built a happy, opportunistic garden from reclaimed materials. They estimate that 60 percent of their garden — plants, benches, ornaments, and so on — is material they personally recovered or recycled. The cost to renovate their entire lot, which is just under 6,000 square feet, was less than $5,000.

Where Minix and Geltz needed a path along one side of the backyard, they made simple paving stones from concrete. They built a frame from Trex decking boards, then laid it on a plastic tarp. They ruffled the tarp, intentionally creating folds that gave each stepping stone a different texture. To finish the path, they set the stones in pea gravel.

They also salvaged bags of hardened concrete — "they were in somebody's trash," Minix says — and stacked them two-high to build border edges in the backyard. Along the side of the house, where they needed to edge a narrow garden bed, they pushed the cut tops of dozens of leftover fence stakes into the ground, one right next to the other, at varying heights.

Even the plants they have put in are ones they recovered or were given by friends. Always focusing on ways to make more from less, Minix and Geltz favor plants that can be propagated from divisions or cuttings. In the spring, the backyard is a riot of daffodils, tulips, dahlias, and iris; the front yard is graced year-round by the steady, undemanding presence of succulents.

Minix and Geltz say they're not garage sale types — they don't go scouting for materials — they just pick up what they come across. The two don't consider themselves scavengers or salvagers (they're recyclers), nor are they packrats. Geltz maintains a strict statute of limitations: "If you haven't used it or touched it in a year," he says, "give it away or sell it." With shirts, both men follow the one-in, one-out rule.

Another economy they exercise is that of bartering. "If you've got a skill, trade with someone who can do what you can't," says Minix. He and Geltz have traded plants for painting a room and for cleaning someone's garden. They also exchange plant materials with many neighbors and friends.

When asked where his zeal comes from, Minix says he's always had the recycling bug. "I've just always believed I should be doing it," he says. When pressed further, he says he follows a maxim passed on by a friend. "Don't think of what it is, think of what it could become."

2 Into the Garden: Look Before You Leap

Many an eager gardener can tell a tale of planting first and then considering the consequences. Whether you create a garden yourself or hire someone to do it for you, the process can be made clearer — and the end result more successful — by taking the time to think things through at the outset.

This chapter covers how to plan a garden and provides a visual example of all the elements a Bay-Friendly garden might contain. For help with assessing your site and planning the garden, use the tear out Garden Design Survey located at the back of this book.

How to Plan a Garden

The following is a general overview of the factors to consider when you want to renovate all or some part of your garden. The best approach is to think first about form and function — what the conditions of your site are and how you use the garden — *then* consider details such as plant choice. See page 30.

1. Get to know what you have. Spend some time puttering. Knock around out there. Prune a few things, pull weeds, put a few plants in the ground. The point is to get to know the place, to build first-hand experience of your little piece of the earth.

2. Consider the structure of the place. This means the hard features — driveway, buildings, fences, paved paths. It also means plant materials — what's already growing in the yard and what shape does it give your garden? For help inventorying your site, see the Garden Design Survey on page 81.

3. Make a simple plan of the property. A property survey was completed for your home at the time it was built, and if you obtain a copy (available in the county assessor's office), it can serve as a base plan. If you don't have the survey or don't want to track it down, you can make one yourself. See "How to Draw a Site Plan," page 20.

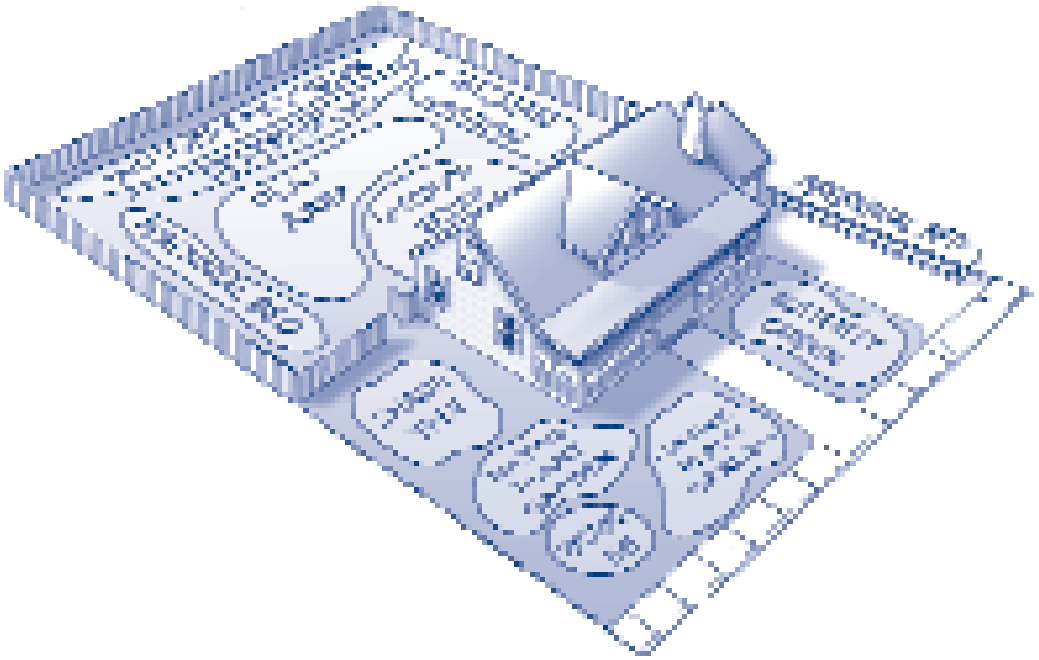
4. Think about how you use the space… Every outdoor space has functions. Make a list of how you use the areas surrounding your home — do your children play in the yard? Do you spend much time gardening? Do you like to look out on the yard from different rooms in the house?

. . . and how you'd like to use it. Very likely you have ideas about the purposes you want your yard to serve. Perhaps you want an outside dining area, or a patio where none exists. Or you need a site for a bigger and better compost pile. Think about those things next, and make a list of them.

Words from the Wise:

Know What You Want, But Accept a Bit of Chaos

Oakland gardener Libby Teel suggests that when you're starting out, it's worthwhile to spend a lot of time thinking about how you want the space to feel. Are you looking for something sculptured, or more chaotic? "A garden offers the opportunity to have slightly organized chaos," she says. It is a creative space that you do not control entirely— "sometimes you have to let it tell you a little bit too."



Start laying out beds
r. Draw on copies of
tracing paper to make
her good trick is to
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racing paper or a
grease
pencil. Black and
white photos are best
ause they show the
clear relief.

ck of your time and
Now consider all of
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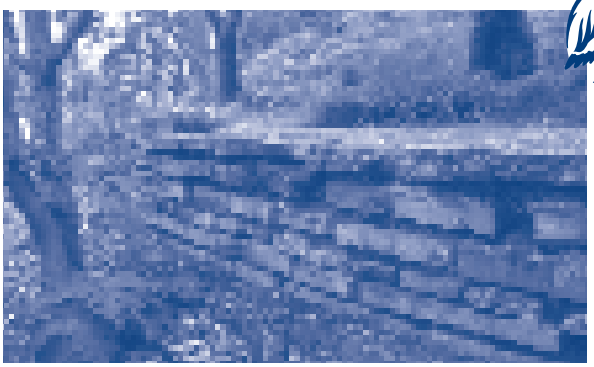
e role you see your-
hese changes about.
urself, how much do you really have time for? What do you want to tackle first?

5. Do a rudimentary layout. List-making constitutes a simple form of planning, and from it you can make some very simple designs. Think of the garden in terms of rooms — connected spaces that have different characters and purposes. Using your base map (or just a blank piece of paper), draw bubbles that loosely represent these rooms.

6. Consider your materials. Once you have a general picture of how you want the garden to be laid out, you can begin to consider the particulars: the wooden fence, the paths, the plants. Make more lists. At this point, think as much in terms of plant characteristics as specific species — consider height, form, color, and cultural requirements. In terms of other materials, keep Bay-Friendly principles in mind — plan to reuse materials on site and buy used or recycled products.

9. Start small. Gardens are dynamic environments. They're always changing, over time and according to season. Your efforts to renovate your yard, and to care for it, will necessarily play out over time too. Now, though, you have a clear sense of where you want to go. Work on one area at a time, gathering materials, building beds, putting in plants, watching the garden grow.



Broken concrete is used to create a retaining wall.

Tip: Use Salvaged Materials

Use fewer virgin materials in your landscape. Reuse existing materials or salvaged materials, when possible, or select recycled products. A number of new recycled landscape products are available in a variety of textures and colors. Many combine recycled plastics with wood by-products. These materials require almost no maintenance and last longer than wood.

For information about sources for salvaged materials, call (877) STOPWASTE or visit www.StopWaste.Org. The California Materials Exchange program offers statewide listings for reused materials — visit www.ciwmb.ca.gov.

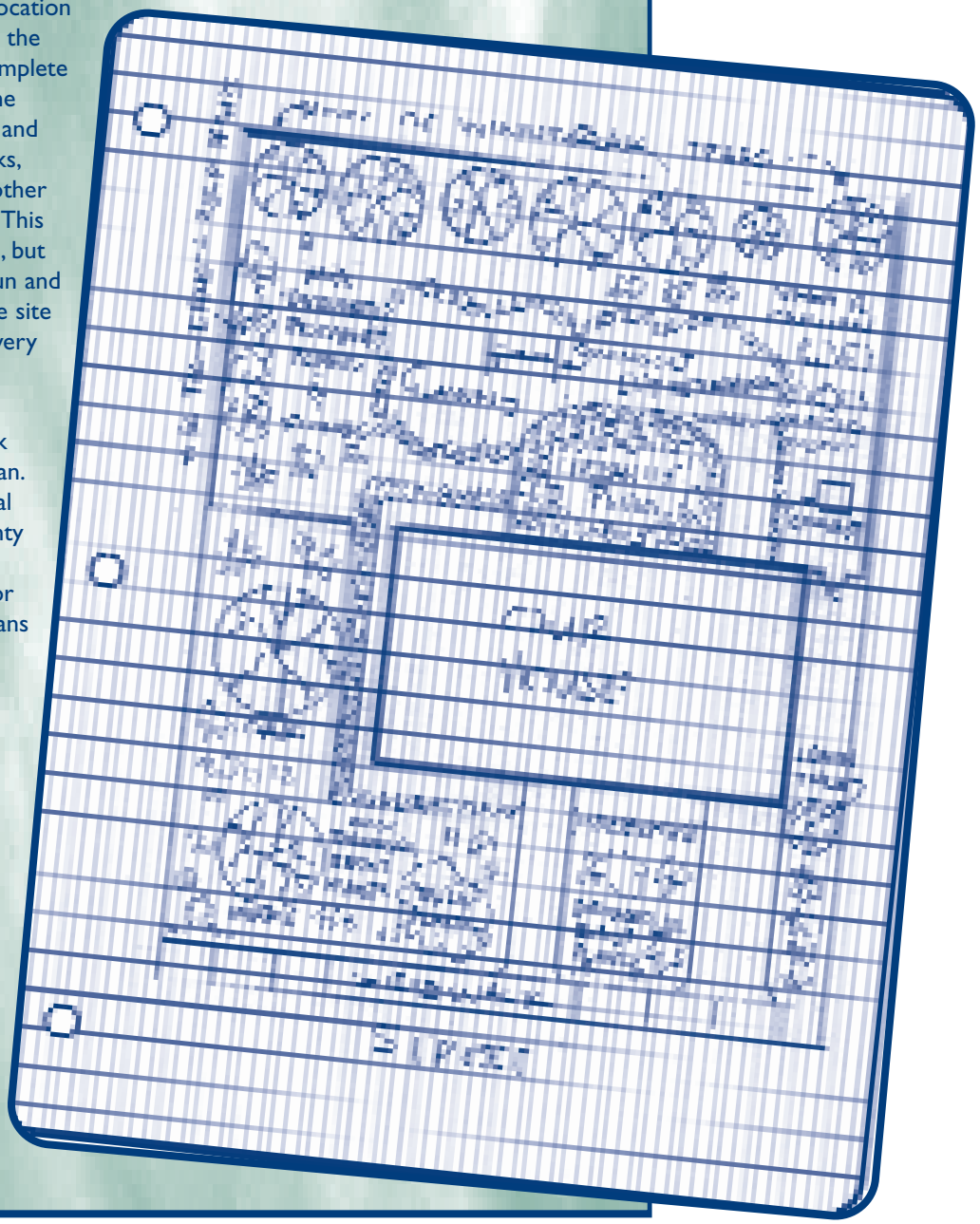
Tip: How to Draw a Site Plan

You'll need graph paper — the best scale is eight squares to the inch. To make sure your yard will fit on a single page at that scale, measure the width and depth of your lot. Translate that to the graph paper by counting one square of graph paper for every foot of your property. Most yards of 80 feet by 60 feet or less will fit onto a regular sheet of graph paper at eight squares to an inch. (The advantage of using this scale is that every 1/8-inch mark on the ruler equals a foot, so you can use the ruler to measure distances, instead of having to count squares.)

Once you've got the right graph paper, it's as simple as making all the measurements and transferring them onto paper. Measure the perimeter of the property. Measure from the perimeter to the house. Mark the perimeter and location of the house on the graph paper. Complete the outline of the house. Measure and draw in sidewalks, driveways, and other hard structures. This can take a while, but the process is fun and the result — the site plan — will be very useful.

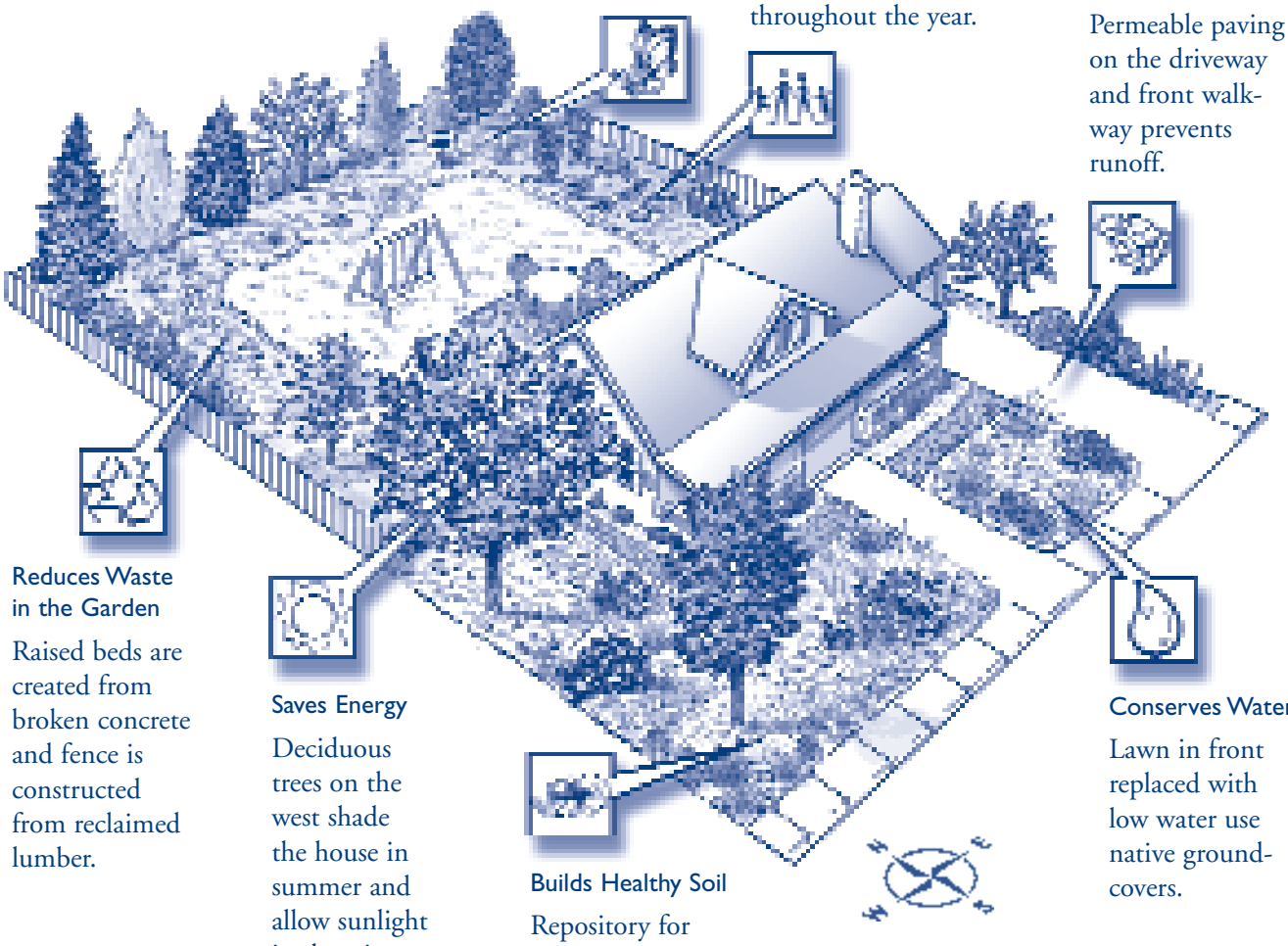
When it's completed, mark north on the plan. Keep the original clean. Make plenty of photocopies and use them for experimental plans and drawings.

Adapted from Rosalind Creasy, The Complete Book of Edible Landscaping.



Picturing the Bay-Friendly Garden

The landscape pictured below illustrates how Bay-Friendly Gardening benefits the gardeners, neighbors, local wildlife and the greater environment. You can reap the rewards of Bay-Friendly with these practices and others discussed throughout this guide.



Creates Wildlife Habitat

Bird-bath provides water for wildlife.

Contributes to a Healthy Community

Organic vegetable garden provides healthy, tasty produce throughout the year.

Protects Local Watersheds and the Bay

Permeable paving on the driveway and front walk-way prevents runoff.

Reduces Waste in the Garden

Raised beds are created from broken concrete and fence is constructed from reclaimed lumber.

Saves Energy

Deciduous trees on the west shade the house in summer and allow sunlight in the winter.

Builds Healthy Soil

Repository for leaves to collect under trees as mulch.

Conserves Water

Lawn in front replaced with low water use native ground-covers.

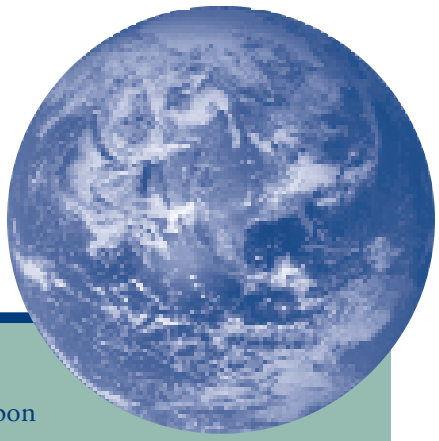
Tackle Climate Change with Bay-Friendly Gardening

The news of global warming is incontrovertible. Signs of climate change are most evident in the polar regions — photos of stranded polar bears and glacial melt convey in no uncertain terms that the cooler regions of our planet are warming quickly. But even in temperate climes such as our own, scientists are seeing changes. Animals in mountainous areas of the United States are migrating to higher elevations, seeking the cooler conditions they're accustomed to. In the Sierra Nevada, as snow pack decreases, wetlands fed by snow-melt groundwater are drying up.

These trends will soon be playing out in our gardens as well. Before long, our Sunset gardening zones may no longer apply. The Arbor Day Foundation, an organization dedicated to encouraging people to grow trees, recently revised the national USDA hardiness zones. According to the new map, parts of coastal California, including areas both north and south of the San Francisco Bay Area, have been moved into a planting zone about 10 degrees warmer than in 1990.

We can expect a warmer and dryer environment locally, and the plants and animals that inhabit our gardens will respond accordingly. The development of plants is temperature dependent, so many will leaf out and bloom earlier. Insect life cycles are also temperature dependent, so their seasonal patterns will be altered as well. One study estimates that global warming will be a boon for aphids in California — warmer temperatures could enable them to reproduce in numbers three times greater than they do now.

Change is upon us, but all is not lost. Even as we begin to see the effects of global warming in our own backyards, there are also steps we can take to arrest climate change.



Greenhouse Gases and Bay-Friendly Gardening

Global warming is caused by the accumulation of several gases—carbon dioxide (CO_2) is the best-known among them — that persist in the upper atmosphere, trapping the heat of the sun like the glass panes of a greenhouse. These gases are primarily the result of burning fossil fuels, so this is the ultimate cause of the climate change we are now experiencing. Methane, which is a byproduct of some microbial decomposition processes, also helps contribute to global warming.

Collectively, the residents of Alameda County are emitting more than 5,700,000 tons of CO_2 annually. Burning fossil fuels in vehicles and for energy use in buildings and facilities is a major contributor to the county's greenhouse gas emissions. Fuel consumption in the transportation sector is the single largest source of emissions, contributing 44 percent of total emissions.

Bay-Friendly Gardening helps reduce greenhouse gases by:

- Reducing transport of materials to the landfill = less CO_2
- Reducing organic debris in the landfill = less CH_4 (methane)
- Reducing fertilizers = less N_2O (nitrous oxide, another greenhouse gas)
- Reducing water consumption = less electricity use = less CO_2
- Increasing soil organic matter = greater absorption of CO_2

Reduce Your *Direct* Output of Greenhouse Gases

If the problem of global warming is the result of an increase in greenhouse gases, then part of the solution clearly lies in reducing our output of these gases. Take steps to reduce the amount of emissions released from related activities.

Use hand-powered tools whenever possible. All hand tools are zero-emission and therefore should be preferred in the garden.

Choose electric tools when more power is needed. Electricity has its own climate-change impacts, but it is the lesser of two evils. Quieter and less energy-intensive, electric tools are lower impact than gas-powered.

Use gas-powered tools as a last resort. When you do use gas-powered tools, choose the smallest, most efficient, lowest-emission equipment — and keep it well tuned. You can improve overall fuel efficiency in a car by as much as 30% just through basic maintenance, and it stands to reason that the results would be similar for power tools. A machine that runs well runs cleanly, emitting fewer pollutants.

Avoid excessive fertilizer applications. Nitrogen based fertilizers are a source of nitrous oxide — the third largest greenhouse gas contributor to global warming. Be careful to use the appropriate amount of fertilizer, whether organic or synthetic, and time your applications when plants most need the additional nutrients and will absorb the nitrogen.

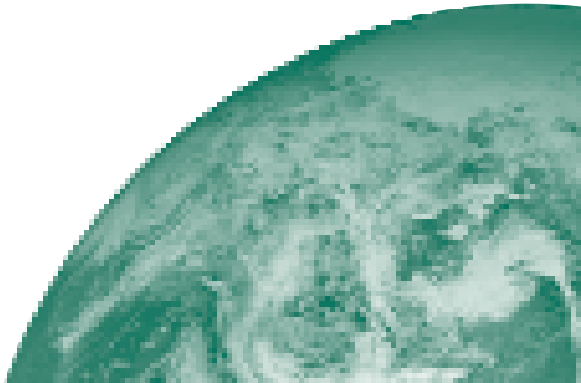
Also Reduce Your *Indirect* Output

The single largest source of greenhouse gas emissions is the generation of electricity. So keep in mind that when you use electricity, you are burning fossil fuels indirectly, and thus contributing to global warming. Here are some ways to reduce your electricity use.

Reconsider your need for outdoor lighting. Most outdoor lighting is for decorative or security purposes. Evaluate where you actually need lighting. In many cases you may find that you can do without — particularly in those areas where lighting is used for decoration. Consider motion sensors where lighting is used for security.

Where outdoor light is necessary, use compact fluorescent bulbs. Compact fluorescent lights use 75% less energy and last up to 10 times longer than traditional bulbs. And they are especially good for outdoor use because they maximize efficiency when in operation for long duration, such as overnight. For each compact fluorescent bulb that replaces an incandescent, almost 700 pounds of carbon dioxide are kept out of the atmosphere. Since all compact fluorescents contain mercury, be sure to dispose of them with other household hazardous waste.

Use solar-powered path lighting and water features. Reduce your impacts even more by stepping off the grid entirely and using the power of the sun to power your outdoor lights and fountains.



Design and maintain your garden for low water use. According to Assemblymember John Laird, moving water from place to place in California is the greatest single consumer of electricity in our state. So by reducing your water use, you reduce your greenhouse-gas output.

The current water usage for landscaping in California Coastal Zones (such as San Francisco Bay Area) is about 55,000 gallons per year per garden. In Alameda County, a 50% reduction in water demand — which is possible through Bay-Friendly Gardening — would result in a cut in energy use equivalent to a reduction of 9,450 tons of CO_2 per year overall, or 54 pounds of CO_2 per year per garden. For tips on how to reduce water use — including using efficient irrigation — see pages 57-59 in this guide.

Hang your clothes out to dry. After the refrigerator, the dryer is one of the biggest consumers of energy in your house. So make space in the garden for a clothesline, and reap the benefits: lower energy use, lower utility bills, more time spent outside, and good-smelling clothes.

Increase Your Intake

In addition to reducing outputs, you can also employ a variety of strategies for increasing the intake of greenhouse gases, resulting in a net reduction to the atmosphere. Plants take in carbon dioxide; so can the soil. Take advantage of these natural processes to decrease the planet's greenhouse-gas load.

Plant a tree. Over its lifetime, a single tree can remove more than a ton of carbon dioxide from the atmosphere. If sited appropriately around your house, trees can also help reduce your energy use.

Grow your own food. The benefits of growing and eating your own food are many. In terms of global warming, you reduce transportation and related emissions and you increase carbon uptake. Organic methods such as minimal- and no-till gardening, improve the soil's ability to capture and stabilize carbon.

Last But Not Least

Bay-Friendly gardening is environmentally-friendly gardening. All its practices can help reduce your contribution to global warming. Especially important are these two simple practices.

Don't forget to compost. In addition to reducing the gas required to haul your garbage to the landfill, when you compost at home, you reduce methane gas emissions. At the landfill, organic materials decompose anaerobically — without oxygen — which results in the release of methane, a potent greenhouse gas. Compost those leaves, grass, plant trimmings and kitchen scraps at home and they'll break down in the presence of oxygen. No methane added. Soil quality and quantity is expected to decline as a result of global warming — making and using compost will help to alleviate that.

Use leaves and trimmings for mulch. In addition to offering the same benefits as composting, using mulch helps keep soil moist, thus reducing water needs. It also builds the soil and increases its ability to store carbon.

Build a Green Roof

Building a green roof — one that has plants on it — can conserve energy by keeping the house insulated. Oakland gardener Greg Powell says his green roof reduces heat retention, reduces glare, and increases rainwater infiltration.

The idea for a green roof came when Powell and his wife were remodeling their home. Their parcel is sloped and they had sited a detached garage below the house. Rather than look out on a bare rooftop, they began to think about planting it. They dug into the slope to recess the garage into the hillside and converted the roof, Powell says, into "a planter box."

Building and having a green roof is not as scary as it sounds, says Powell. "We build floors strong enough to support grand pianos, so we can build roofs strong enough to support dirt," he says. To figure out how to do it, Powell first went online; he found descriptions of large-scale projects such as the living roof on the new Academy of Sciences in San Francisco, and adapted this information to his needs. He used housing foundation materials to provide waterproofing and drainage, added a layer of horticultural pumice on top of that for extra drainage and as a root barrier, and then layered about four inches of dirt on top.

Powell says plant choice is important — he avoided large, woody plants, choosing instead to put in shallow-rooted succulents and grasses. (The Academy of Sciences building in Golden Gate Park features low-growing coastal natives such as beach strawberry and sea pink, as well as a local succulent and herbaceous wildflowers.)

For anyone considering a green roof, Powell recommends looking at one that's been done and talking to anyone with an interest in the topic. To plan and install his roof, Powell got advice from architect friends; he also paid an engineer to calculate loads and thus ensure that the structure would be sound.

The Play of Air and Light: Kid-Friendly Gardening in Berkeley

When Wanda Nusted retired from the classroom, she didn't want to stop working with kids, she wanted a different setting. An art teacher with little prior gardening experience, Nusted turned her backyard into a playground where, on any given day, her three grandchildren and two or three neighborhood friends might be playing tetherball, searching for spider webs, or driving handmade cardboard cars between peaceful garden beds.

The garden serves as creative inspiration for Nusted, who goes into the yard as soon as she gets up each day, and as a varied and stimulating play space for the children. Nusted has created a series of playrooms along the fence around the perimeter of the yard; in the center is a large garden bed. Each playroom is furnished with toys or tools to engage the imagination, encourage hand-eye coordination, and so on.

In the back corner is a ball court—a short pole is strung with a tennis ball, and there are plastic racquets nearby. A couple five-gallon pots hold the tennis racquets as well as plastic golf clubs waiting to be picked up and swung. The golf holes—plastic ramps and traps—have been placed along the edge of garden beds and the path. Elsewhere, a milk crate loaded with trucks and a plastic jar filled with figurines and farm animals await the animation that only children can give them.

Nusted has also brought art into the garden. Always using plants as an inspiration, she painted abstract flowers on canvas and hung them along the fence. She also involved the children in painting a garden mural on the side of the house. Nusted made large ceramic beads that she slipped over old standing lamp posts, creating tall, narrow, colorful sculptures—"plant shapes," Nusted says, "that don't have to be watered." Using inverted flower pots as a base, she made mosaic statues that give the garden even more color and variety.

Sometimes, when it is raining lightly, Nusted and the kids stand under her photinia, a small evergreen tree. They look at the wind in the leaves and watch as some of them fall, later collecting them for the mulch pile. (Nusted is also good about keeping leaf litter in place; in autumn, her garden beds all wear a loose mantle of their own organic matter.)

As an artist, Nusted is enchanted by the movement of air and the ever-changing light in the garden, and she encourages the children to notice these things too. A homemade windsock announces wind direction and pace. A small grove of mylar pinwheels, planted in Nusted's center garden bed, share the same news. Along the fence, she has tacked up a couple dozen CDs that sparkle and flash when the sun catches them. The kids make bubbles, chasing them as they float.

3 Gardening from the Ground Up

Gardening is about plants, but it's also about what plants grow in — dirt. Without soil, very few plants can survive; without the organic material that plants provide, most soils become lifeless. Bay-Friendly Gardening starts here, on the ground floor, with a look at what soil is and how to care for it. Plant selection and plant placement are also considered in this chapter, which concludes with a brief description how to plant.

The Nitty Gritty on Soil

Every gardener's ideal is a soil called loam. Dark and wonderfully crumbly, a good quality loam has high organic content, is teeming with life, contains all the nutrients that plants need, holds moisture well, and drains well. It has excellent structure and texture, and provides the optimum combination of soil's main components: minerals, air, water, organic matter, and soil-dwelling organisms.

Minerals

Gardeners categorize soils based upon the size of their mineral particles. Coarse sand (which has the largest particles) is at one end of the continuum and fine clay (the smallest of the small) is at the other. In the middle is silt. The physical character of any garden soil is determined by how much sand, silt, and clay it contains.

You can feel this character — a soil's texture — between your fingers. Clay soil is smooth to the touch, and if you squeeze it when it's wet, it holds together. Sand, on the other hand, is loose and grainy regardless of whether it's wet or dry, and the grains are visible to the naked eye.

Soil texture greatly influences a soil's water-holding capacity, because water molecules are attracted to the surfaces of the mineral particles. Clay soils, because the particle sizes are small, have greater surface area and can become quite sodden. The larger, fewer grains of sand give water less to cling to. Texture also plays a large role in determining a soil's nutrient-holding capacity and how quickly or slowly a soil warms in the spring.

Structure

While constituent particles determine the texture of a soil, the arrangement of those particles determines its structure. Just as water clings to particles' surfaces, the particles themselves cling to one another, forming aggregates. These define a soil's structure. Like texture, structure influences how much water the soil can hold, how easily the soil releases nutrients, and how much air the soil contains. Unlike texture, however, which is more or less immutable, gardeners can change their soil's structure, either for good or for bad.

Sandy Soil

Clay Soil

Silty Soil

Loam

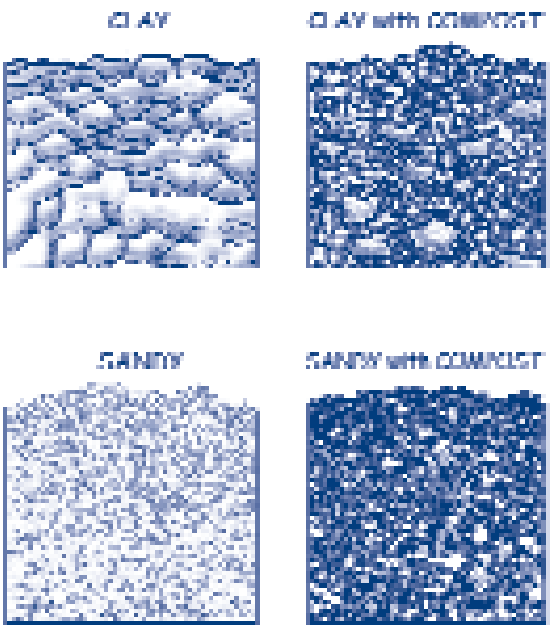
When a gardener digs in the soil, he or she creates openings and introduces air into the soil. This is good. But too much digging, or digging in the wrong circumstances, can degrade soil structure. Shoveling or hoeing dry soils diminishes aggregation — instead of hanging together, soil particles are torn apart. Aggregation is also lost by handling very wet soils. Instead of being torn apart, though, soils become too packed and clumpy.

Tilling should be done initially to install a planting bed and then only infrequently or not at all after that. The preferred method for improving soil structure over time is mulching or top dressing with organic materials.

Compost

Organic material is different forms of living or dead plant and animal material. Fallen leaves. Grass clippings. Wood chips. Sawdust. Manure. Kitchen scraps. It is compost, which is the cornerstone of organic gardening and a universally recognized soil amendment. Above all, compost is food for the living organisms in the soil. And keeping soil critters well fed ensures that all the other qualities a gardener seeks in soil will gradually increase. Adding compost ensures that soil will have:

- Good structure
- Sufficient water retention
- Proper drainage
- Nutrient supply and cycling
- Disease resistance



Compost helps loosen clay soil, allowing air and water to penetrate. Compost unites fine particles in sandy soil, allowing greater water-holding capacity.

Tip: Testing Your Soil

Soil tests typically tell you the nutrient levels in your soil, what its pH is, and whether or not it contains any contaminants, such as lead. Consider doing a soil test when:

- You begin gardening in a new house and want to identify nutrient deficiencies or any contaminants left by previous owners.
- You are designing or redesigning and installing a new garden.
- Plants are having consistent and serious problems.
- You live in an older home with lead-based paint on exterior walls.
- You live within half a mile of a major roadway, freeway, or industrial area, and want to produce food in your home garden.

To obtain a home soil test kit, order from:

Peaceful Valley Farm
P.O. Box 2209
Grass Valley, CA 95945
(530) 272-4769
Order line: 1-888-784-1722
www.groworganic.com

To have your soil tested and a report returned to you, contact:

A and L Western Laboratories
1311 Woodland Avenue #1
Modesto, CA 95251
(209) 529-4080
www.al-labs-west.com/index.html

Lead Prevention

Lead poisoning prevention programs can provide more information about lead testing and prevention in the home and garden. Check the phone book for your local program

Building & Protecting Healthy Soil

Whether or not you are one of the lucky gardeners who already have loam, there are plenty of things you can do to protect and improve your soil.

Guard against erosion. Plant bare soil or keep it covered with mulch. Organic mulches are preferable to inorganic ones, as they will slowly decompose, adding nutrients to the soil and improving its structure over time.

Prevent compaction. Keep most areas in the garden relatively untrodden. Use consistent pathways to navigate your yard. (A thick layer of wood chips on your paths can also help prevent compaction.) Avoid walking on wet soils and areas where you have recently loosened the soil. In general, don't tread on areas under cultivation.

Cultivate with care. Till the soil when it is moist, but not wet. Experiment a little to get a feel for the desired moisture level — the soil will handle easily and retain its integrity as you move it around. If possible, loosen soil with a fork instead of a shovel or rototiller. Once its structure has improved, minimize tillage.

Add compost and mulch. Mulching is an easy way to begin. Grasscycling — leaving clippings on the lawn — is another simple way to restore soil health. Compost, the foremost form of organic recycling, can be dug into the soil or laid on as topdressing.

Encourage earthworms in the garden. Earthworms are the true tillers of the soil, digging tunnels, carrying leaves down into their burrows, and mixing and sifting the earth. To encourage earthworms in the home garden, keep a layer of mulch on the soil year-round, and use gardening methods that are environmentally- (and earthworm-) friendly. In particular, avoid quick-release synthetic fertilizers and over-tilling, which can kill or harm earthworms.

Tip: Checking Soil Texture by Feel

Take a one- or two-tablespoon sample of soil in your hand. Slowly add water and knead the sample until moist. Try to form the sample into a ball. Squeeze it to see if you can make a cast (an impression of your fingers). Gently stretch the soil out between thumb and forefinger and try to make a ribbon. Note the feel of the soil as you are working it and use the table below to determine its texture.

Characteristics of Soil Sample	Soil Texture
Soil will not stay in a ball. Loose and single grained with a gritty feeling when moistened	Sand
A cast will form but it can't be handled without breaking and will not form a ribbon. Soil feels slightly gritty.	Loamy sand
A short ribbon can be formed but breaks when about 1/2 inch long.	Loam
A ribbon can be formed. It is moderately strong until it breaks at about 3/4 inch length. Soil feels slightly sticky.	Clay loam
The soil can easily be formed into a ribbon that is an inch or longer. Soil feels very sticky.	Clay

Adapted from S. J. Thein, "A Flow Diagram for Teaching Texture by Feel Analysis," *Journal of Agronomy Education*

Choosing Appropriate Plants

Since Charles Darwin introduced it some 150 years ago, much has been made of the idea of natural selection, that mechanism through which evolution occurs. Far less attention has been paid, however, to the fact that gardeners exercise the power of selection all the time, and that their choices also have powerful consequences in the natural world.

Plant selection is one of the most important aspects of Bay-Friendly Gardening. Today, in addition to choosing plants for their beauty and fragrance, we also take into account a plant's fitness for the environment in which it will grow. Appropriately chosen and placed plants will:

- have greater pest resistance
- require less care
- use fewer resources
- generate less waste

Selecting Plants

But how to choose? This section provides a wealth of suggestions designed to help you do just that. Though these considerations may seem numerous, they are all of a piece, each reinforcing the other. As you try plants out in the garden, running through these guidelines becomes second nature.

Know your climate. California's mild temperatures and persistent sunshine are famous for a reason: they're uncommon. Few places in the world share with California its wet winters and sunny, dry summers. These are the characteristics of a Mediterranean climate, and they bring with them special growing conditions — most notably the need to choose plants that are well adapted to an annual six-month drought.

Know your climate zone. The *Sunset Western Garden Book* identifies 24 climate zones in an area that extends from Montana, Wyoming, Colorado, and New Mexico to the West Coast. The Bay Area includes zones 14-17; knowing your particular zone provides a useful shorthand for many of the factors that influence which plants are likely to succeed in your garden.

Know your microclimates. In addition to the broader conditions that influence your garden, every site also creates its own conditions, or microclimates. Those shady spots or dry patches, or the place where the soil's rocky — these and myriad other factors specific to your home territory will influence what plants will do well, and where, in your garden.

Know your soil. Since soil is the matrix in which all plants grow, knowing your soil and choosing plants that grow well in it will go a long way toward ensuring success. Most plants will thrive in soil that is well amended with compost, but a few plants, such as buckwheat or cactus, thrive in poor soils.

Grow Mediterranean climate plants. Almost any plant can be made to survive in a Bay Area garden. But a plant that is native to an area with a

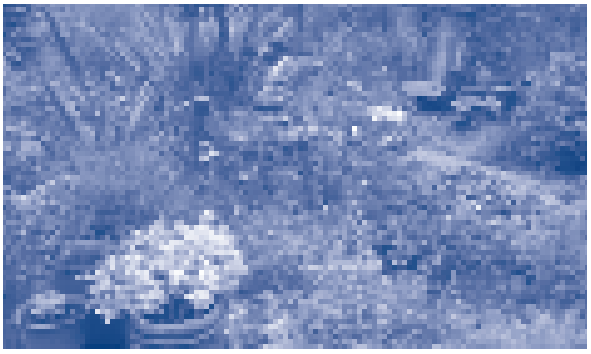
Words from the Wise:

Take Advantage of Microclimates and Go for the Slow Growers

Bill Merrill, an avid home gardener who manages a nursery in Fremont, demonstrates that in every yard, there are many microclimates the gardener can take advantage of. He points to a lemon tree, which, he says, "creates the equivalent of a lathe house." In the winter, Merrill hangs potted Christmas cactuses, begonias, and cyclamen from the branches of the tree, where they receive some sunlight and are protected from frost and wind. Similarly, he has planted subtropical guava and cherimoya trees in the shelter of a taller, hardier avocado.

Merrill also suggests avoiding fast-growing plants, as they can be a liability in the garden. They're "a pain in the rump," says Merrill, when it comes to maintenance. "Their root systems are often highly invasive; the cost to remove such plants can become very significant in a short frame of time, and they can also be more susceptible to insects and disease. Plants that grow at a slow to moderate rate," Merrill concludes, "are good."

Mediterranean climate often requires less water, fewer pesticides and fertilizers, and possibly less pruning than a species that originated in, say, a humid rainforest. Regions that enjoy a Mediterranean climate, such as South Africa and Southwestern Australia are the source of thousands of garden plants, so the gardener will find no shortage of choices.



Grow California native plants. California native plants are ones that occur naturally somewhere in the state. Just like garden plants that originated in more far-flung locales, California natives have been collected by botanists and horticulturalists and developed for use in the garden. Most are drought-tolerant; many are a good bet for your yard.

Grow local native plants. In the same way that there can be microclimates within a garden, conditions can vary in small but significant ways on the landscape scale as well. When gardening with local natives, you are celebrating these differences and upholding them. And you are literally going to the source — you can't find plants that are better adapted to life in the San Francisco Bay Area or are better fitted to support local wildlife — than the ones that evolved here.

Learn about local plant communities and use them as models. Whether you are using a palette of Mediterranean climate plants, California natives, local natives, or a mix, you can look to open spaces in the Bay Area for inspiration in the garden. Taking hikes on your own or with a group such as the California Native Plant Society is a great way to spark your creative genius. Visiting local creek restoration sites, demonstration gardens, and botanic gardens are also great inspiration. (For a simple description of Bay Area plant communities, see pages 12-15.)

Sources of California Natives

Although there are more than 1,500 plants native to the Bay Area, local natives have only recently become popular in the nursery industry. Look for them, or California natives, at the following nurseries:

California Flora Nursery
Fulton, CA
(707) 528-8813

Cornflower Farms
Elk Grove, CA
(916) 689-1015
www.cornflowerfarms.com

Larner Seeds
Bolinas, CA
(415) 686-9407
www.larnerseeds.com

Mostly Natives Nursery
Tomales, CA
(707) 878-2009
www.mostlynatives.com

Native Here Nursery
Berkeley, CA
(510) 549-0211
www.ebcnps.org

Ploughshares Nursery
Alameda, CA
(510) 898-7811
www.ploughsharesnursery.com

The Watershed Nursery
Berkeley, CA
(510) 548-4714
www.thewatershednursery.com.

Yerba Buena Nursery
Woodside, CA
(650) 851-1668
www.yerbabuenanursery.com

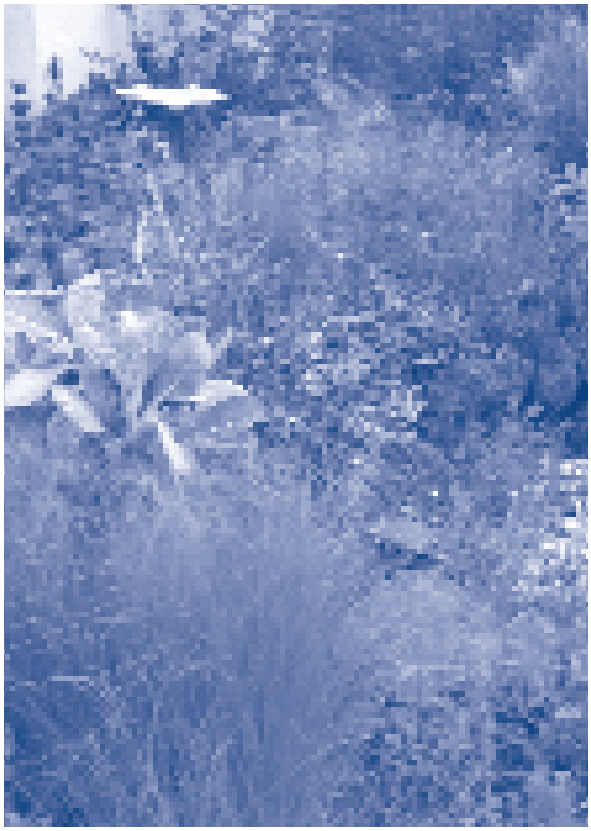
Also ask your current nursery if they'll supply more local CA natives.

Choose diversity of plants. If nature abhors a vacuum, it loves diversity. To support maximum garden health and promote wildlife from the microfauna on up, plant varying sizes and types of plants. Having plants of different heights — from trees to groundcovers — will provide for the needs of more bird, insect, and animal species. It will also help shape your garden, giving you a framework or structure within which to work. To ensure year-round interest in the garden for both humans and wildlife, grow deciduous species as well as evergreens, and choose plants that flower and fruit at different times.

Choose perennials. A diverse garden will include annuals, biennials, and perennials — but the majority of plants will be perennials. Because they make garden maintenance easy, often require less irrigation, and result in less waste, perennials are the plants of choice for the Bay-Friendly Garden. In addition to using large and small shrubs, try herbaceous perennials — those that die back to the ground each year. There are many perennial grasses, too, that make great wildlife plants and excellent garden subjects.

Minimize the lawn. An appreciation of green lawns is deeply imbedded in our society and, perhaps, even in our psyches. But in a climate that undergoes six months of drought annually, a big lawn can be a costly and wasteful proposition. If the lawn is a must-have for you, keep a smaller one as a picnic area or a play space for children, and consider other ways to satisfy that visual and physical need for inviting, open spaces in a garden. Substituting a native bunchgrass such as red fescue for conventional turfgrass, planting a drought-tolerant groundcover such as wooly thyme, or paving paths and garden rooms with wood chips are just a few of the possibilities.

Plant trees. If Americans love lawns, we love trees even more. Their beauty and longevity intimate great things; their tall limbs offer us protection from sun and wind. Evergreen trees make the best windbreaks, while deciduous trees will shade your house in the summer and permit it to be warmed by the sun during winter. Plant on the west and southwest side of the house to shade it — your cooling costs could be reduced by as much as



40%. Trees provide shelter for a variety of birds and insects, and they also catch the rain, keeping more water on site and improving groundwater flows. Small trees should be at least 10 feet and large trees at least 20 feet from the house to avoid root damage to the structure.

Avoid invasive species. Of the thousands of plants that have been brought to California either intentionally or inadvertently, a few have become pest plants — weeds of wildlands and open spaces. These plants can spread across the landscape quickly, crowding out a variety of other plants and the animals that depend upon them. Despite these tendencies, some of these plants, including periwinkle, English ivy, French and Scotch broom, and pampas grass, are still sold for ornamental uses. Do not buy them, and ask your nursery to stop carrying them.

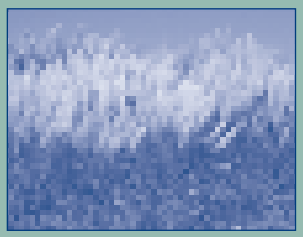
Avoid Invasive Garden Plants of the Greater San Francisco Bay Area

Invasive Plants		Non-Invasive Plants
Latin Name	**Common Name**	**Instead Try**
Carpobrotus edulis	Iceplant or Hottentot Fig	*Delosperma cooperi* (Hardy Iceplant) or *Osteospermum fruticsum* and hybrids (Freeway Daisy) or *Drosanthemum floribundum* (Showy Dewflower)
Cortaderia selloana	Pampasgrass	*Chondropetalum tectorum* (Cape Thatching Reed) or *Muhlenbergia lindheimeri* (Lindheimer's Muhly Grass) or ***Carex spissa*** **(San Diego Sedge)** or ***Nolina bigelovii*** **(Bigelow's Bear Grass)**
Cotoneaster lacteus, C. pannosus	Cotoneaster	***Heteromeles arbutifolia*** **and cultivars (Toyon)** or *Feijoa sellowiana* (Pineapple Guava) or *Arbutus unedo* (Strawberry Tree) or *Viburnum suspensum* (Sandankwa Viburnum) or *Cistrus mitis or* x *Citrofortunella microcarpa* (Calamondin Orange)
Cytisus scoparius, C. striatus, Spartium junceum, Genista monspessulana	Scotch, Portuguese, Spanish or French Broom	*Jasminum nudiflorum* (Winter Jasmine) or *Cornus mas* (Cornelian-cherry Dogwood) or *Kerria japonica* (Japanese Kerria) or ***Ribes aureum*** **(Golden Currant)** or *Phlomis fructicosa* (Jerusalem Sage) or *Hypericum rowallane* (Shrub Hypericum)
Hedera helix, H. canariensis, Vinca major	English Ivy, Algerian Ivy, Periwinkle	*Campanula poscharskyana* (Serbian Bellflower) or *Trachelospermum asiasticum* (Ivory Star Jasmine) or or *Rubus pentalobus* (Taiwan Raspberry) or *Heuchera maxima* and hybrids (Giant Alumroot) or ***Asarum caudatum*** **(Wild Ginger)** or *Helleborus foetidus* (Bear's Foot Hellebore) or *Bergenia cordifolia* and hybrids (Winter Saxifrage)
Helichrysum petiolare	Licorice Plant	***Salvia leucophylia*** **(Coast Purple Sage)** or *Teucrium fructicans* and cultivars (Bush Germander) or *Phlomis fructicosa* (Jerusalem Sage) or *Artemisia* 'Powis Castle' or **Eriogonum giganteum (St. Catherine's Lace)**
Sesbania punicea	Scarlet Wisteria	*Calliandra tweedii* (Brazilian Flame Bush) or *Lagerstroemia* species (Crape Myrtle) or *Cassia leptophylla* (Gold Medallion Tree) or **Galvezi speciosa (Showy Island Snapdragon)**

ADAPTED FROM: *DON'T PLANT A PEST! GIVE THEM AN INCH AND THEY'LL TAKE AN ACRE....,* CALIFORNIA INVASIVE PEST COUNCIL

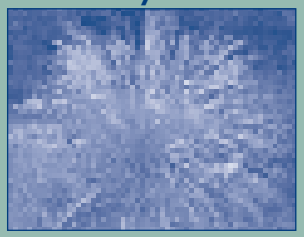
SUGGESTED ALTERNATIVES IN BOLD ARE CALIFORNIA NATIVE SPECIES.

Invasive



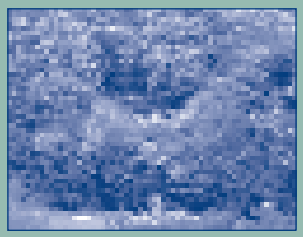
Cortaderia selloana
(Pampas Grass)
PHOTO: BRIANNA RICHARDSON, 2003

Instead Try



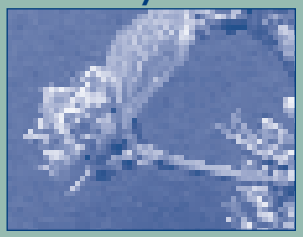
Muhlenbergia lindheimeri
(Lindheimer's Muhly Grass)
PHOTO: BLUESTEM NURSERY, WWW.BLUESTEM.COM

Invasive



Genista monspessulana
(French Broom)
PHOTO: BARRY RICE, THE NATURE CONSERVANCY

Instead Try

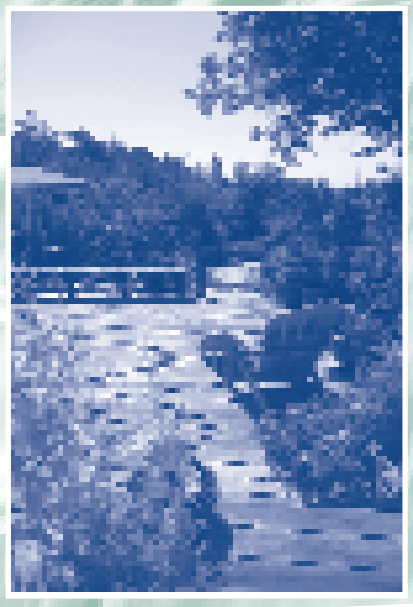


Cornus mas
(Cornelian-cherry Dogwood)
PHOTO: MISSOURI BOTANICAL GARDEN

Calm and Colorful: Creating an Urban Retreat in Oakland

Libby Teel's gardening career began years ago, when she put in a few plants at the base of a tree. "I had one little vision of something pretty," she says. Now her whole yard, back and front, is filled with Mediterranean climate plants that offer endless possibilities for composition and combination.

Mediterranean plants — which come from one of five small areas on the planet that have a wet-winter, dry-summer climate like ours — offer a dynamic range of possibilities for ornamental gardening. They are appropriate for our region, but impose no limits on plant choice. Libby's garden, which exemplifies this, is an international symphony of color, texture, leaf shape, and flower.



"With very few exceptions, I've got all perennials," says Libby as she surveys her backyard from the deck behind the house. At the bottom of her sloping lot, she has put in tall, showy shrubs that lift up the lower end of the yard and don't require a lot of care, including flannel bush, wild lilac, and California anemone. Other large specimens provide focal points in the beds that run alongside the fences of this narrow, pie-shaped backyard. Libby's favorite colors are strong, warm ones, and she has given them full play.

In an area near the deck, for example, the deep purple leaves of smoke tree contrast in shape and color with the long blades of New Zealand flax. At their base, a golden sphere lends sculptural interest and sends out a glow. Three kinds of gaillardia, a sunflower family plant, add other warm hues while orange calibrachoa, a low-growing perennial that resembles a petunia, completes the tableau. Viewed from another direction, the smoke tree enters into conversation with the dark blues of a hibiscus and a 'storm cloud' lily of the Nile.

Libby recommends spending a lot of time going to nurseries without buying anything. "Stock at nurseries is seasonal," she points out, so it changes. She wanders the aisles of the East Bay Nursery and Berkley Horticultural Nursery, but she also peruses plants at her local Longs and Ace Hardware. She makes her choices based on what these places carry. Her chief reference is the Sunset Western Garden Book.

In the front yard, Libby originally planted olive trees and lavender. The trees have grown beyond her wildest expectations, she says, making the beds much shadier. So she is experimenting with new plantings. A yellow Graham Thomas rose droops gracefully over a collection of sages, catmint, and yellow shasta daisies. Evergold sedge rubs shoulders with several green-and-white hebes, showing just a hint of purple. The palette is yellow, white, and lavender — no gaudy pinks or magentas allowed. The evergold sedge, one of Libby's favorites plants, inspired her to use more plants with variegated leaves. "Since I get more shade now," she says, "I have to find light in leaf color."

Getting Started with Bay-Friendly Plants

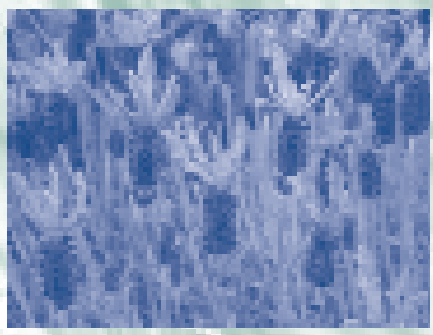
Among the many Mediterranean climate and California native plants that are well-suited to our unique Bay Area ecosystem, the following list includes plants that offer a good start for creating a Bay-Friendly Garden. In addition, these plants:

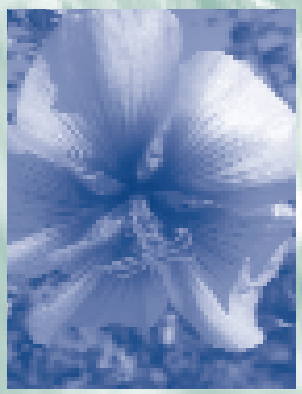
- Thrive in the Bay Area's micro-climates.
- Grow fairly easily.
- Are drought tolerant.
- Are relatively disease resistant.

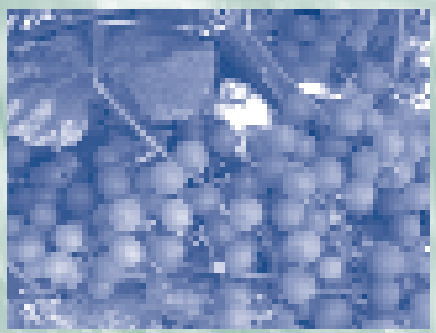
Trees	
Arbutus 'Marina', Arbutus unedo	Strawberry tree
*Cercis occidentalis**	Western redbud
Leptospermum laevigatum	Australian tea tree
Shrubs	
Abelia x grandiflora	Glossy abelia
Arctostaphylos species and cultivars	Manzanita
*Artemisia californica**	California sagebrush
Buddleja davidii and cultivars	Butterfly bush
*Ceanothus spp.**	California lilac
Correa species and cultivars	Australian fuchsia
Cotinus coggygria and cultivars	Smoke tree
*Garrya elliptica**	Silktassel
*Heteromeles arbutifolia**	Toyon
*Lavatera spp**	Tree mallow
*Mahonia spp.**	Mahonia, OR grape
Phlomis fruticosa	Jerusalem sage
*Rhamnus californica**	Coffeeberry
*Ribes sanguineum**	Red flowering currant
Rosmarinus officinalis	Rosemary
Teucrium fruticans	Germander
Westringia fruticosa	Coast rosemary
Perennials	
*Achillea millefolium**	Yarrow
Alstroemeria hybrids	Peruvian lily
*Calamagrostis foliosa**	Reed grass
*Carex tumulicola**	Berkeley sedge
Epilobium canum	California fuchsia
*Erigeron spp.***	Fleabane
Guara lindheimeri	Gaura
*Heuchera micrantha**	Coral bells
*Iris douglasiana** *(or Pacific Coast hybrids)*	Douglas iris
Lavandula species and cultivars	Lavender
*Mimulus aurantiacus**	Sticky monkey flower
*Muhlenbergia rigens**	Deer grass
Penstemon species and cultivars	Beard tongue
Phlomis fruticosa	Phlomis
Perovskia atriplicifolia	Russian sage
*Polystichum munitum**	Western sword fern
*Salvia spp.***	Sage
Sesleria autumnalis	Autumn moor grass
*Sisyrinchium**	Blue-eyed grass
Thymus spp.	Thyme

Vines	
Clytostoma Callistegioides	Violet trumpet vine
Hardenbergia Violecea	Lilac vine
*Vitis californica**	California wild grape
Wisteria spp.	Wisteria

*Denotes plants native to California.
** Certain species are native to California.







Putting Plants in Their Place

Not only the plant itself but its placement in the garden will influence its success. This means taking a plant's needs and growth habits into account. When choosing where to plant, consider these few guidelines.

Remember this motto: the right plant in the right place. Though we know that plants have different needs, it is all too easy to forget them when it comes to planting. Whether you're considering putting in one plant or an entire bed, make note of the plant's cultural requirements before you put it in the ground, and match them to the sites in your yard.

Plant with mature size in mind. One of the most common mistakes gardeners make is to crowd plants into spots that are too small for them. The consequence of this is that plants have to be pruned severely or pulled out and replaced — both of which mean more waste. To avoid this mistake, get to know the habits of your plants *before* installing them.

Plan for plant succession. The look and feel of a newly planted garden is very different from one that's five or ten years old. Think of the future when you are planting, and choose a variety of plant types and sizes (from annuals to perennials and groundcovers to trees) to provide interest in the garden at every stage of its development.

Words from the Wise:

Your Drought-Tolerant Plants Might Appreciate a Mound

For gardeners contending with difficult soils, Livermore landscape architect Kat Weiss recommends making mounds. Plants that like good drainage, as many drought-tolerant plants do, especially appreciate a little lift. "Even six inches," says Weiss, "can make a big difference." Adding mounds also adds interest to the garden by changing its topography.

Lawn replaced with diverse plant choices.

Tip: Overseed with Wildflowers

It's easy to misjudge the mature size of your plants when planting. Figure out ahead of time how large your perennials will grow to be and plant accordingly — which means giving them plenty of space. In the meantime, you can get that filled-in look fast by seeding the bare spots with wildflowers.

Planting Well

Though most plants can handle being transplanted without too much coddling, taking care is nonetheless worthwhile — you'll lose fewer plants and thus generate less waste. In this section, the how-to of planting is briefly described.

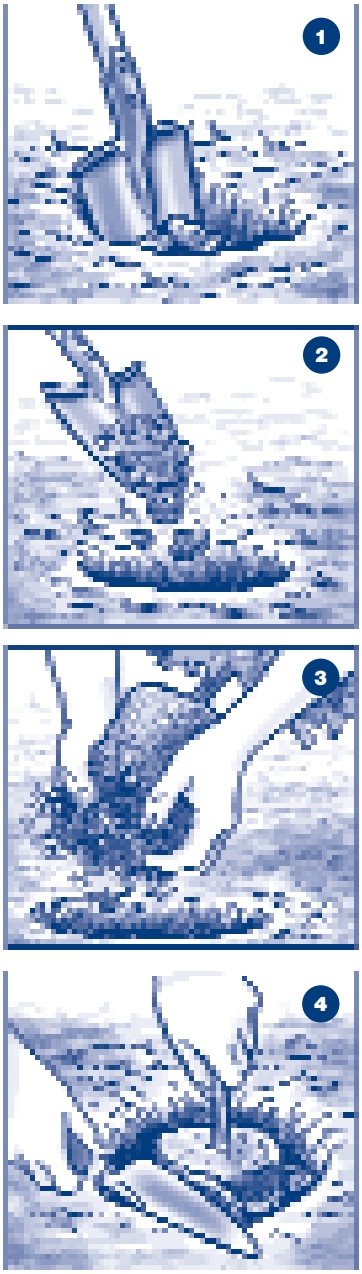
1. Clear the ground first. More than one gardener has planted first and then weeded ever after. If you are working in a yard that hosts a robust collection of weeds, take the time to deal with them before you plant — ultimately it will make your gardening experience a more agreeable one. To make the task manageable, clear one section at a time. (For more on handling weeds, see "Contending with Weeds," page 65 and "Sheet Mulching Basics," on the following page.)

2. Dig a hole. Using a shovel, dig a hole that is as deep as the rootball and 3 times wider than it. Rough up the sides of the hole.

3. Rough up the root ball, and cut away any large roots that have circled at the bottom of the container.

4. Partially backfill the hole with soil mixed with compost, creating a mound at the bottom, and place the plant on it. Give attention to the straightness of the plant (it should be perpendicular to the ground, not leaning at an angle), and to the arrangement of its branches in relation to the other plants and objects around it. Is the plant's best side facing out?

5. Mix compost into the garden soil. Some gardeners have found that putting a lot of organic matter in a planting hole can make it hard for the plant to extend its roots past the edge of the hole into the heavier soil. To avoid this (but still give the plant the benefit of an extra dose of compost), mix 1 part compost with 3 to 5 parts soil to backfill the hole after putting the plant in.



Tip: Recycle Your Pots

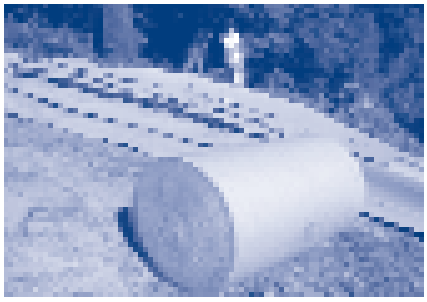
Many nurseries will take back empty plastic plant containers. Berkeley Horticultural Nursery sends them back to growers; Alden Lane Nursery in Livermore reuses them on-site. Some of the local native plant nurseries and propagation groups also accept donations of containers. Make a few calls to locate the place to recycle pots nearest you.

Sheet Mulching Basics

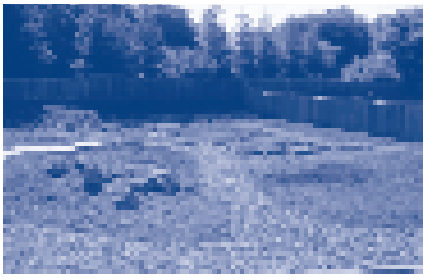
Sheet mulching is a layered mulch system. It is a simple and underutilized technique for optimizing the benefits of mulch. Sheet mulching can be used either in establishing a landscape, or to enrich existing plantings. In both cases, mulch is applied to bare soil or on top of cut or flattened weeds. Trees, shrubs, herbaceous perennials and annuals are planted through the mulch, or a small area is left open to accommodate established plants.

Sheet mulch can:

- Suppress weed growth
- Reduce labor and maintenance costs: weeds are composted in place
- Improve nutrient and water retention in the soil
- Encourage favorable soil microbial activity and worms
- Enhance soil structure
- Improve plant vigor and health, often leading to improved resistance to pests and diseases



Recycled cardboard is a good weed barrier.



Sheet mulched site is ready for planting.

Step 1: Prepare the site. Knock down or mow existing vegetation so that it lies flat. Remove only woody or bulky plant material. The organic matter left will decay and add nutrients to the soil. Add fertizilers and amendments to this layer if a soil analysis indicates the need. Optional: "jump start" the decay of weeds and grass by adding compost or manure at the rate of about 50 lbs/100 square feet. Soak with water to start the natural process of decomposition. It is much easier to soak the ground now, before the remaining layers of mulch are applied.

Step 2: Plant 5 gallon and larger plants.

Step 3: Add a weed barrier. The next layer is an organic weed barrier that breaks down with time. It is essential that the barrier is permeable to water and air. Do not use plastic. Recycled cardboard, a thick layer of newspaper, burlap bags or old carpets of natural fiber work well. Many paper companies offer recycled cardboard or paper in rolls of varying widths. Two or three layers may be required to achieve an adequate thickness. But, if the weed barrier is applied too thickly, the soil can become anaerobic. Overlap pieces 6-8 inches to completely cover the ground without any breaks, except where there are established plants you want to save. Leave a generous opening for air circulation around the root crown. Wet down the cardboard or paper barrier to keep it in place.

Step 4: Layer compost and mulch. The top layer mimics the newly fallen organic matter of the forest. Good materials for this layer include chipped plant debris, tree prunings, leaves or straw. They must be free of weed seeds. Well decomposed, weed-free compost is also a good material but it should be spread directly over the weed barrier and covered with bulkier materials such as chipped tree prunings, to optimize weed control. In total, the compost/mulch layer should be 2-5 inches deep. Many materials suitable for the top layer often have an attractive appearance, making sheet mulch a versatile practice.

Step 5: Plant. Punch a hole in the cardboard and place plants in the soil under the sheet mulch. Smaller plants can often be planted right into the mulch/compost layer. Add a small amount of compost around the rootball if compost has not been included in the top layer.

In most cases, the benefits of sheet mulching outweigh the costs. However, take care to prevent these potential problems:

- As with any mulch, do not pile materials up against the trunks or stems of plants to prevent disease.
- Especially during the dry season, small seedlings will need protection from snails and slugs that will seek cover under the mulch.
- Protect young trees from rodents with physical guards.

ADAPTED FROM: C.R. ELEVITCH AND K.M. WILKINSON, *SHEET MULCHING: GREATER PLANT AND SOIL HEALTH FOR LESS WORK*, PERMANENT AGRICULTURE RESOURCES AND GEOFF HALL, SHEET MULCH, SENTIENT LANDSCAPE, INC.

PHOTOS (TOP): KAMALA BENNET, SENTIENT LANDSCAPE, INC. (BOTTOM): KAMALA BENNETT, SUSTAINABLE LIVING DESIGN, INC.

Doing Away with the Lawn:
From Conventional to Bay-Friendly in Livermore

When she and her family moved in, the yard surrounding Kat Weiss's suburban Livermore home was almost entirely lawn. Her husband liked it. "Fine," Kat told him, "you water it, mow it, and fertilize it, if that's how you want to spend your Saturdays." Two weeks later, she says, he came to her and asked, "Okay. What do you want to do instead?"

Kat wanted California natives and a sustainable design. A mechanical engineer who went back to school to become a landscape architect, she wanted a freer, more varied garden that would need less water and maintenance. But first she had to get rid of the lawn. After seeing a speaker at the local garden club demonstrate sheet mulching as a technique to suppress unwanted plants, Kat decided to give it a try — and ended up converting her entire yard using this technique.

She started in the front, in the summer. It's good to do this work in the fall, Weiss says, to take advantage of winter rains. Sheet mulching is essentially a form of composting, and every composting process requires moisture. But it was the height of summer and Kat was rearing to go, so she watered the lawn to moisten the ground and encourage a flush of growth that would, ultimately, become natural fertilizer.

She used a flat-head spade to dig out a twelve-inch strip of sod around the perimeter of her front yard. She tossed the uprooted chunks of lawn, dirt-side up, onto the remaining lawn and proceeded to cover the whole of it with cardboard. On top of that, she laid down a six-inch layer of wood chips. The strip she'd cleared at the edges, being lower than the pavement around it, kept the chips from spilling over onto the sidewalk and driveway. Weiss let it rest for a few months, and then began to plant into it.

The front yard is now a mixed habitat of grasses and perennial shrubs. "I love the grasses," says Weiss, "because there's always movement." For best effect, Weiss suggests grouping them. The exception is deer grass — "it's very architectural," Weiss explains. "It stands on its own." The side of the house, where Weiss broke up a concrete RV pad, is now a vegetable garden. She moved the slabs of concrete into a corner of the back yard to make a low, stepped wall. Weiss retained a hedge of roses planted by the previous owner but has furnished much of the backyard with a fescue meadow. A blue door with mirrors leans against the back wall, extending the size of the yard and suggesting a secret passageway. Nearby, three big blue pots sit on the lowest steps of the corner wall. Weiss says she often uses pottery and sculpture to enliven a dry landscape.

4 Gardening Day to Day and Through the Seasons

Like any activity *that takes place over time, gardening is both an immediate and a cumulative experience. We garden day to day and through the seasons, experiencing the satisfaction of tucking a seedling into the ground one morning and of seeing it flower or produce food months later.*

It is in the day to day that gardeners have the greatest opportunity to be Bay-Friendly. Whether or not you compost, how you prune, what you do with your grass clippings, how you water — these kinds of practices determine how environmentally friendly your garden will be.

In this chapter, core Bay-Friendly Gardening practices are described, in these separate sections:

- *All About Composting*
- *Worm Composting*
- *About Feeding the Soil*
- *Mulch Basics*
- *Grasscycling is Easy*
- *Water Conservation*
- *Pruning for Plant Health*
- *Integrated Pest Management*

Builds Healthy Soil

Reduces Waste in the Garden

Conserves Water

Creates Wildlife Habitat

Protects Local Watersheds and the Bay

Contributes to a Healthy Community

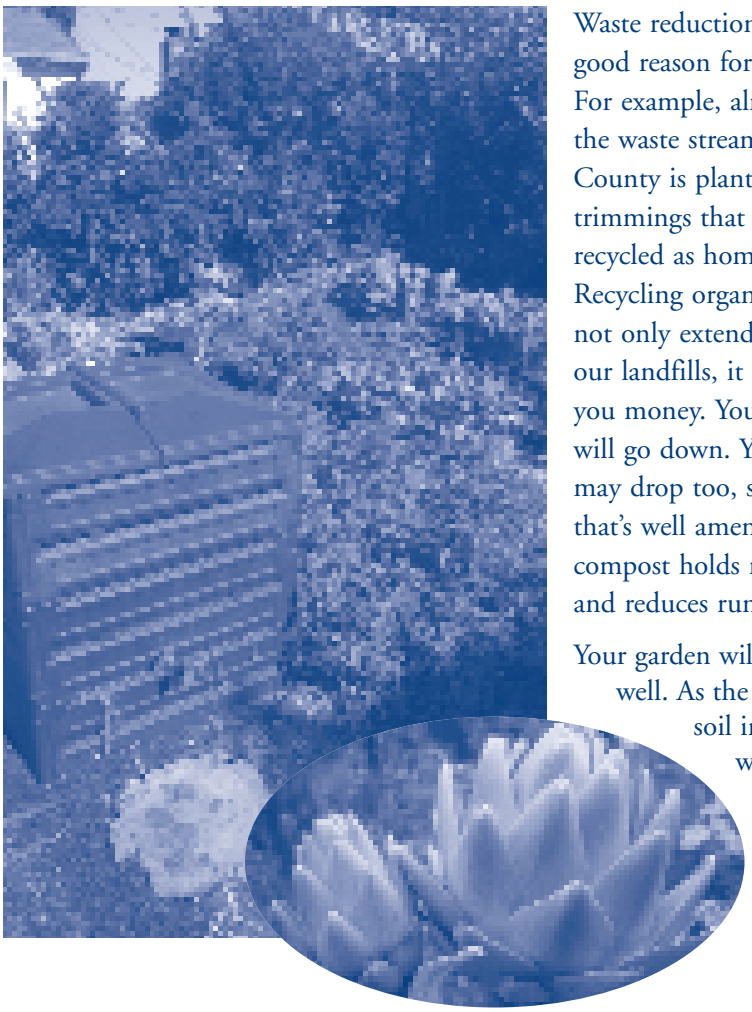
Saves Energy

In the following pages, the icons shown above signal the benefits offered by each gardening practice.

It is something of a miracle to see broccoli stems, orange peels, and fallen leaves change into dark, sweet-smelling earth. Composting — collecting organic materials and combining them in a manner that will encourage their breakdown — makes use of the natural process of decomposition to create a high-quality soil conditioner.

All About Composting

Composting appeals to the thrifty person in all of us. It feels good to keep materials on site and cycle them back into the yard. And composting results in a very valuable product. The best soil amendment — your own homemade compost — is one that money can't buy.



Waste reduction is another good reason for composting. For example, almost 20% of the waste stream in Alameda County is plant and vegetable trimmings that could be recycled as home compost. Recycling organic resources not only extends the life of our landfills, it can also save you money. Your garbage bills will go down. Your water bills may drop too, since a soil that's well amended with compost holds moisture better and reduces runoff.

Your garden will benefit as well. As the health of your soil improves, so will the health of your plants.

Benefits of Composting...

Composting Basics

The microorganisms that break down organic material in your soil will happily do the same job in a pile of fallen leaves and plant trimmings. The composter creates optimal conditions for nature's crew of decomposers — the bacteria, fungi, and bigger creatures such as sow bugs and worms — to go to work.

Compost has four main ingredients: Browns, Greens, Air, and Water. Browns are dry, woody materials such as fallen leaves, pruned shrubbery, pine needles, newspaper, and so on. Greens are moist, nitrogen-rich materials such as fruit and vegetable trimmings, grass clippings, and fresh weeds. Air and Water are the essential ingredients without which our industrious microfauna could not transform Browns and Greens into compost.

To make compost, simply combine Browns and Greens in more-or-less equal proportion, and make sure the pile has enough air and water. The formula looks like this:

- **Chop** materials to help them to break down more quickly.
- **Mix** Browns and Greens.
- **Maintain** air and water balance by keeping compost as moist as a wrung-out sponge.

Compost is ready to be used when it has a nice, earthy smell and a dark, crumbly appearance — like coffee grounds, only moister and not so uniform. If any items of food are still discernable, they can be screened out and added back to the bin.

Composting Methods

From these basic steps, a variety of composting methods have been developed. Which you choose depends on the material you're composting and how much effort you want to put into it. Provided below is a brief description of the most common methods of composting.

Plant Trimmings Only

The simplest way to compost is by collecting your yard trimmings and making a pile of them. The pile can be an open one, or you can keep it in a bin.

No Fuss Compost. Add chopped or unchopped yard trimmings to a rodent-resistant bin on an ongoing basis. Maintain the pile by keeping it as moist as a wrung-out sponge. Harvest finished compost from the bottom and center of the pile after 12 to 18 months.

Become a Master Composter

Composting offers the opportunity to transform organic matter into a rich soil amendment and to transform yourself — into a Master Composter! Through a comprehensive four-month training that includes classroom presentations, hands-on activities, and field trips, Alameda County residents can learn about soil health, the art and science of composting, and Bay-Friendly Gardening techniques.

An integral component of the program is community outreach. Upon completion of the training, Master Composters provide 40 hours of community service, teaching others about composting and Bay-Friendly Gardening.

Master Composters come from all walks of life, and their outreach projects reflect their diverse backgrounds and experiences.

Participants pay a $25 enrollment fee (that may be waived upon request) and receive a free compost or worm bin. Certification is awarded based on class attendance and completion of an outreach project. For more information, call (510) 444-SOIL (7645). Visit www.BayFriendly.org for a list of other Bay Area Master Composter programs.

For more information on compost bins, and how-to materials, call 510-444-SOIL (7645) or visit www.BayFriendly.org.

Note: the County Environmental Health Department requires rodent-resistant systems for composting fruit and vegetable trimmings. Use a container with a lid, a floor, and no opening greater than 1/4 inch.

Active Compost. Chop yard trimmings into pieces 6 inches or smaller and combine them in an open pile or simple bin. Be sure to balance Browns with Greens. Add new materials as often as you like. Maintain the pile by turning or mixing it about once a week and keeping it as moist as a wrung-out sponge (if it's an open pile, covering it with a plastic tarp will help retain moisture). Harvest finished compost by sifting out coarse, unfinished materials after 3 to 8 months.

Fruit, Vegetable, and Plant Trimmings Combined

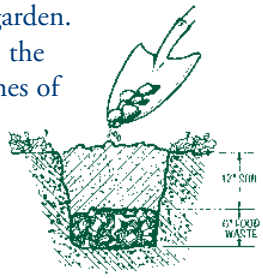
When adding fruit and vegetable trimmings to a pile, one must take into account that these high-moisture, high-nitrogen materials break down quickly and can be a bit soppy. A good rule of thumb is to never let fruit and vegetable trimmings make up more than a third of the compost pile. Fresh food trimmings can also attract animals, so use a rodent-resistant bin, mix them with plenty of Browns, and bury them deep. Never dump food and run!

Mixed Compost. Chop yard trimmings into pieces 6 inches or smaller and put them in a rodent-resistant bin. Bury food scraps in the center of the pile, mixing well as you add them. Add material as often as you like, keeping a balance of Browns and Greens. Maintain the pile by turning or mixing it about once a week and keeping it as moist as a wrung-out sponge. Harvest finished compost by sifting out coarse, unfinished materials after 3 to 8 months.

Fruit and Vegetable Trimmings Alone

There are several systems for composting fruit and vegetable trimmings alone. All of them are designed to take advantage of the high nutrient content and quick breakdown of these materials. Whenever you compost fruit and vegetable trimmings, make certain to use a rodent-resistant bin or bury them at least one foot under the soil surface. Use a container with a lid, a floor, and no opening greater than 1/4 inch, or bury food scraps at least one foot under the soil surface.

Underground Composting. Dig an 18-inch hole in any empty part of the garden. Chop and mix food scraps into the soil. Cover with at least 12 inches of soil. No harvesting is necessary with this system — the compost enriches the soil directly. One to three months later, you can bury more compostables in the same place.



Closed-Air Systems or Food Digesters. Rather than bury food scraps, you can put them in a container that holds 6 to 10 months' worth. Closed-air bins have tight-fitting lids and holes or a wire screen on the bottom to provide contact with the soil and prevent rodent entry. They can be made from garbage cans or bought from a garden supply catalog. Your best bet is to buy or make two, so you can add new materials to one while compost is maturing in the other.

Select a convenient, well-drained location in the garden, dig a hole, and bury the bottom 12 to 18 inches of the bin. Pack the soil firmly around the bin to make sure it is secure. Add food trimmings to the bin on an ongoing basis, and cover each addition with a layer of shredded newspaper, dry soil, or sawdust (this will keep odors down and discourage fruit flies). Keep the lid on tight. When the first bin is three-quarters full, dig a hole for the second one and begin to fill it. When it is three-quarters full, the first bin should be ready for use in the garden. Empty it and begin the process again.

Do Compost

(Browns)

Fallen leaves
Chopped, woody prunings
Pine needles
Most sawdust

(Greens)

Grass clippings
Plant trimmings
Leaves
Weeds without seed heads
Fruit and vegetable trimmings
Coffee grounds and filters
Citrus rinds
Tea bags
Herbivore manures

Don't Compost

Grains, beans, or breads
Sawdust from plywood/treated wood
Meat, bones, or fish
Dog, cat, or bird feces
Diseased plants
Dairy products or grease

Harvest finished compost by sifting out coarse, unfinished materials.

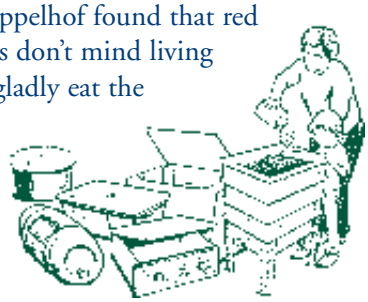
Troubleshooting for Basic Composting

For additional information, visit www.BayFriendly.org, or call the Compost Information Hotline at (510) 444-SOIL (7645).

Symptoms	Causes	Solutions
Pile not composting	Too dry	Add water until slightly damp and turn.
	Too much brown matter	Add fresh green matter, herbivore manures, or fruit and vegetable trimmings and turn.
Pile smells rotten and/or attracts flies	Too wet and/or too many food scraps or lawn clippings	Turn and add browns or dry soil.
	Food scraps exposed	Bury and mix food scraps into pile.
	Non-compostables in pile	Remove meat, dairy products, grease, etc. and turn.
Rodents in pile	Food scraps in open bin or bin with holes larger than 1/4 inch and/or non compostables	Use traps or baits, rodent proof bin, remove meat, grease, etc. and turn.

Worm Composting

This method of composting began to be popularized in the United States about 20 years ago, when Mary Appelhof published *Worms Eat My Garbage.* Appelhof found that red wiggler earthworms don't mind living in a box, and will gladly eat the same things we do. A pound of red worms can eat 65 pounds of food trimmings in less than three months. The worm castings, or vermicompost, are a high-quality soil amendment that can be used for house and garden plants. To get started with worm composting, follow these steps.



1. Buy a bin or build one out of wood, plastic, an old dresser drawer, shipping crate, or barrel. Your bin needs to be 10 to 16 inches deep, have holes in the bottom or sides for ventilation, and have a snug-fitting lid. To keep rodents out, the holes need to be 1/4 inch or smaller. The rule of thumb for bin size is two square feet of surface area per person. An average two-person house would need a bin about 4 square feet, or two bins that are 2 square feet each.

2. Pick a place. Locate your bin where it will not freeze or overheat — in a pantry, kitchen corner, laundry room, garage, basement, patio, deck, or in your garden.

3. Make a worm bed. Worms like to live under lots of moist paper or leaves. This helps keep them cool and moist, gives them fiber to eat, and prevents fruit flies from getting to their food. To make your worm bed, tear black and white newspapers into one-inch strips, fluff them up, then moisten them with a spray bottle so they are completely wet but not dripping. Fill your bins three-quarters full with this moist bedding. Shredded cardboard, leaves, compost, sawdust, and straw can also be added in as bedding. Do not use glossy paper or magazines. Sprinkle bedding with a few handfuls of soil.

4. Adopt some worms. Compost worms are often called "red worms" or "red wigglers." Their scientific name is *Eisenia fetida.* They are different from earthworms and nightcrawlers, which live underground. You can find red wigglers in an old compost pile, get them from a friend's worm bin, or buy them from a worm farm (call the Hotline for a list of sources). Start with one half to one pound of worms, or two nice big handfuls.

5. Feed your worms. Give your worms about a quart (one pound) of fruit and vegetable trimmings, then leave them alone for a couple of weeks while they get used to their new home. After that, feed your worms about a quart of food scraps per square foot of surface area in your bin per week. To avoid fruit flies and odors, bury food under the bedding.

6. Maintain your worm bin. Always keep a 4- to 6-inch layer of fresh bedding over the worms and food in your bin. Add fresh bedding every time you feed the worms. Keep bedding as moist as a wrung-out sponge. In a plastic bin, add dry bedding to absorb excess moisture. Wooden bins may require adding water occasionally.

7. Harvest and use your worm compost. You can start harvesting worm compost 2 to 3 months after you set up your bin. Simply reach in and scoop out the brown crumbly compost, worms and all. You can also move the contents of the bin to one side, place fresh bedding and a handful of soil in the empty space and bury food there for a month or two. Harvest the compost after the worms have migrated to the new food and bedding. To keep your worms healthy, harvest at least once a year.

By adding nutrients and humus to the soil, worm compost will help your plants thrive. Sprinkle a 1/2-inch to 1-inch layer of worm compost at the base of indoor or outdoor plants, or blend no more than 20% worm compost into potting mix or garden soil.

See Troubleshooting Tips on page 48.

A Tradition of Innovation: Growing Organic Edibles in Sunol

Organic gardening is a tradition that runs deep in Jim O'Laughlin's family. His parents gardened in Sunol, the small town in southern Alameda County where Jim still lives — and so did his grandparents. O'Laughlin's forbears were all "organic-minded," he says. They preferred to rely on natural processes to raise their fresh fruit, vegetables, and flowers. O'Laughlin's dad subscribed to *Organic Gardening* magazine; Jim does too. And he buys seeds, tools, and other goods from the same suppliers his father patronized.

Saving Seeds, Growing Edibles Year-Round

O'Laughlin has always liked to "be outside, digging in the ground, planting, watching things grow," and he keeps three-quarters of an acre in year-round cultivation behind his house. On one side of his garden, O'Laughlin built a greenhouse in order to be able grow his own starts. "I used to plant veggie seeds in the ground," says O'Laughlin, "but I got spotty results." O'Laughlin sows seed in six-packs, then moves the seedlings to four-inch pots before they go into the ground. Using this technique, he gets "100% take" when the plants go in.

In addition, O'Laughlin saves seed. "I get better germination from saved seed than from bought seed," O'Laughlin says, "especially if the seed is a year old or less." Marc Rogers, author of *Saving Seeds* (Storey Publishing, 1990) makes the point that "if you raise and save seed, you are producing seed for your garden, and, by careful selection over several generations of plants, you can produce plants best suited to your climate and your gardening conditions." In the late summer and early fall, for example, O'Laughlin collects seeds from his lettuce plants and immediately sows them again. He gets great germination rates and keeps himself in salad year-round.

Many of the plants from which O'Laughlin saves seed — lettuce, carrots, beets, shallots, swiss chard — are plants that can be grown year-round. A few vegetables, such as corn squash, and tomatoes, require more heat and are summer-only growers. And the slow-growers — shallots, garlic, onions — take a full nine months to mature. Most plants, however, can be planted in the fall for a late winter harvest and then planted again in the spring for summertime eating.

Raising Chickens

At the back of the garden there's a chicken coop — at least, that's where it is sometimes. This coop — called a tractor — is movable. Following guidelines in the book *Chicken Tractor* (Good Earth Publications, 2000), O'Laughlin built a rectangular frame that is wire-covered over one half; this end also has a lid that opens from the top. The other end is an enclosed, two-story house, where the hens sleep by night and lay eggs by day. The tractor can be moved the same way a wheelbarrow is — one end has arms you lift; the other, small wheels to roll on.

O'Laughlin keeps ten Rhode Island Reds, dependable layers known for their easy

disposition. He feeds them garden wastes — the armfuls of swiss chard, for example, that O'Laughlin tossed in the tractor one day were gone the next — as well as a laying mash. They also dine on organic wastes from the kitchen.

Aside from providing the freshest eggs possible, O'Laughlin's chickens offer many other benefits. First, they scratch — that is, they turn the earth. And they add first-class fertilizer to the soil wherever their coop is parked. They provide pest control — they eat insects and weeds. Roll the tractor to a weed patch and those unwelcome plants will be nibbled to the ground in no time. Chickens also provide a sort of companionship; they are another living element in the garden ecosystem.

Growing Soil

In a garden, O'Laughlin says you're growing two things: plants and the soil. Of the two, he feels growing the soil is more important. "If you grow the soil," he says, "then when you start growing plants, you have a much better chance." O'Laughlin cares for his soil through composting, mulching, and using cover crops.

Cover crops add nutrients to the soil both through their root systems and by being cut when green and turned into the ground. O'Laughlin uses a mix that includes vetch, fava, field peas, and oats. Three out of four of these plants are members of the pea family, a group of plants known for fixing nitrogen — that is, they draw nitrogen from the air and incorporate it into their bodies, much as we humans do with oxygen.

Chicken Basics

∑ When you keep chickens you're keeping hens. Hens can lay eggs without a rooster — the eggs are just infertile.
∑ A chicken coop is the "entire hen habitat, which includes a chicken run and a henhouse."
∑ A chicken run is the outside space. The henhouse is "a fully enclosed wood structure inside or adjoining the chicken run." Inside the henhouse are perches, where the hens sleep, and nest boxes — "small, private cubicles where hens lay their eggs."
∑ Chickens need no less than two square feet in the henhouse and four square feet in the run. (Bantams, which are smaller, only need half those amounts.)
∑ Know your city or county's code regarding backyard chickens. Most municipalities allow residents to keep chickens, but they may have rules regarding the numbers you can keep and the coop's proximity to property lines.

— Adapted from *Keep Chickens!* by Barbara Kilarski (Storey Publishing, 2003).

In keeping with the rest of the garden, O'Laughlin's compost operation is large-scale. "Whatever comes out of the garden" goes into the compost pile, says O'Laughlin. "Nothing is taken away." O'Laughlin uses the compost to make his own potting soil, roughly in a proportion of five parts screened compost to one part each of sand, vermiculite, and perlite. He also topdresses his veggie and flower beds.

Besides conserving water and adding organic matter to the soil, mulch also keeps plants — and their produce, such as squash and cucumbers—off the ground, which in turn keeps them clean. For growing potatoes, O'Laughlin puts the seed potatoes on the soil surface, then adds one to two inches of compost and eight inches of straw. "Then it's easy to pick the potatoes without disturbing the soil," he explains. O'Laughlin kneels down and, rustling through the straw, pulls out a half-dozen good-sized Yukon golds that, when steamed later the same day, were so sweet they tasted like candy.

Troubleshooting for Worm Composting

For additional information, visit www.BayFriendly.org, or call the Compost Information Hotline at (510) 444-SOIL (7645).

Symptoms	Causes	Solutions
Worms are dying	Food and bedding all eaten	Harvest compost, add fresh bedding and food.
	Too dry	Add water until slightly damp. Add moist bedding if needed.
	Extreme temperatures	Move bin so temp is between 55° and 77° F. Make sure bedding is adequate.
Bin attracts flies and/or smells bad	Food exposed or overfeeding	Add a 4- to 6-inch layer of bedding and stop feeding for 2 to 3 weeks.
	Non compostables	Remove meat, dairy, etc.
Sowbugs, beetles in bin	These are good for your worm compost!	

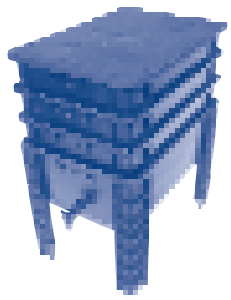
Order a Low-Cost Compost Bin

Alameda County residents can special order an easy, clean, and low-cost home composting bin. And we'll deliver the bin right to your doorstep. Maybe the only thing more convenient is home composting itself.

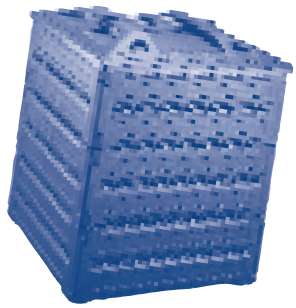
- You must be a resident of Alameda County to receive a bin. Because these are publicly subsidized, residents are limited to one Smith & Hawken Biostack backyard composting bin and one Wriggly Wranch worm bin at the reduced price.
- All bins come with free information on how to start and maintain a compost pile. Bins include a free copy of the DVD *"Do the Rot Thing."*

Order a bin on-line at **www.StopWaste.Org** or by calling (510) 444-SOIL (7645). Find a discount compost bin program in other counties of the Bay Area by visiting www.BayFriendly.org.

Check the website or call for information on current pricing and shipping.



Wriggly Wranch



Biostack

Having learned the ins and outs of composting, you'll also want to consider how to use it in your garden. This section describes how to amend or topdress garden soil with compost. It also explains the difference between soil amendments and fertilizers and describes the benefits of natural amendments over aesthetic ones.

About Feeding the Soil

Products that promote plant growth through indirect, physical means — that is, by adding to the soil — are amendments. Compost is defined as a soil amendment; so are straw and aged manure. These products help plants along by improving soil structure and texture. Fertilizers, on the other hand, support plant growth directly by providing essential plant nutrients. Though soil is the vehicle for the delivery of nutrients, fertilizers are not considered an amendment to it.

Your own homegrown compost is a slow-release fertilizer, but when you dig it into the soil, you are amending the soil and ultimately increasing its nutrient- content, holding, and cycling capacity.

Adding Compost and Mulch

Because healthy soils grow healthy gardens, adding compost to the soil is an important Bay-Friendly Gardening practice. Compost can be added to the surface of the soil or they can be dug in.

Topdressing, or laying an amendment on the surface, keeps soil in place and helps it retain moisture. Another plus for topdressing is that there is no risk of damaging soil structure because no digging is involved.

Incorporating compost into the soil delivers organic material directly to plant roots and microorganisms. Care must be taken, however, not to till the soil too often. Cultivate the first year, then eliminate tilling over time by simply topdressing. Soil can be aerated by gentle use of a digging fork.

Maintain good soil structure. Till your soils no more than once or twice a year. Unless you have very heavy clay, use hand tools instead of a rototiller. (As its structure begins to improve, even clay soils can be loosened with a shovel or fork instead of a rotary tiller.) Also avoid compacting freshly tilled soils. Once you've turned the soil, don't turn it again, and try not to tread on it.

Dig in. Compost can be added to soil wherever you have plantings. If you are creating a new bed, spread 2 to 4 inches of compost over the soil and then dig it into the top 6 to 12 inches of the bed. If you are putting in individual plants, dig a hole that is as deep as the rootball and 3 times wider than it. Rough up the sides of the hole. Mix 1 part compost with 3 to 5 parts soil to backfill the hole after putting the plant in.

Topdress freely. Spread fully decomposed compost around new and existing plantings. Put it under trees and shrubs and in garden beds, but leave 6 to 12 inches uncovered at the base of every plant. Use a layer no more than 2 inches thick, to ensure that air and water can easily pass through. Replenish every 6 months to a year, as needed. Using a coarse mulch as the final top layer will help suppress annual weeds.

Benefits of Soil Amendments…

Why Feed the Soil?

Like humans, plants require certain nutritional elements for optimal growth and health. Some of these — carbon, hydrogen, and oxygen — they take from air or water. The rest come from the soil.

There are three primary nutrients: nitrogen, phosphorus, potassium. These are the N, P, and K, respectively, that one sees on fertilizer packages. A plant needs more of these elements than any other, so they have to be more frequently replenished in the soil. Each supports a particular function, such as the growth of leaves (nitrogen), the formation of fruit (potassium), and the ripening of seeds (phosphorus). There are three secondary nutrients (calcium, magnesium, and sulfur) and fourteen micronutrients.

In general, Alameda County soils contain all the nutrients plants require, and the regular addition of organic matter is adequate to replace what's used by ornamental plants. But if you're growing fruits and vegetables, you may be taking more out of the soil, in the form of fresh greens and tomatoes, than the regular application of compost can put back in. In that case, more nutrients may need to be added, by using a cover crop or by applying slow-acting fertilizers. It is always better to feed the soil than to feed the plant alone; quick release fertilizers can destroy soil life.

About Fertilizers

The purpose of all fertilizers is to provide plants with the nutrients that are essential to their health and growth. Using soil tests, plant appearance, intuition, and experience, gardeners decide which nutrients are needed. "Complete" fertilizers provide the big three — nitrogen, phosphorus, and potassium. Others provide one or two of these nutrients or are sources of secondary or micronutrients.

Having determined what nutrients their plants need, gardeners must also give thought to how those nutrients will be provided — they must decide, that is, what kind of fertilizers to use. There are three main types: organic, natural inorganic, and synthetic.

Organic fertilizers are those made solely from plant and animal materials. They are not always labeled with the nutrients they provide because levels vary and can be hard to determine (many gardening books however, provide estimates). Common organic fertilizers include manure, alfalfa meal, bone meal, and kelp.

Natural inorganic fertilizers are rock minerals such as greensand and rock phosphate. They are derived from natural sources and typically are used to address specific nutrient deficiencies.

Synthetics are just what the name suggests: man-made materials. They are inexpensive and fast-acting, but do not contribute to overall soil health. Though synthetic fertilizers provide nutrients, they often do so at the expense of beneficial organisms. Synthetic fertilizers can turn soil into a lifeless medium over time. Synthetic nitrogen and phosphates, in particular, have been identified as major sources of pollution and should be avoided.

Tip: Make a Tea for Your Plants to Drink

Many gardeners make liquid fertilizer from compost or worm castings. In addition to adding nutrients to the soil, compost tea also helps control plant diseases. Use about a pound of solids for every couple gallons of water, and let the tea steep in a covered container for eight hours. Aerate the mix using a bubbler, such as those used in fish tanks. When it has "steeped," drain off the tea and use it to water your plants; pour the slurry into your compost pile or anywhere that it can be left to break down.

Some Low-Impact Approaches to Fertilizing

To build overall soil health and tilth, use a recycled material such as compost. To provide more targeted fertilization, try the following techniques.

Use worm castings. Worm manure, which goes by the name of *castings*, is one of the best fertilizers around. Worm castings are available commercially but can also be generated at home. (For more about this process, see page 45.)

Use green manures. Instead of composting them, gardeners can add organic matter to the soil by turning plants back into the ground. In this technique, which is also called cover cropping, plants are turned under before they flower. Legumes, such as clover, fava, and alfalfa, are most often used. Ryegrass is another common cover crop.

Use aged herbivore manures. It has been used to increase soil fertility for thousands of years. Nutrient levels vary from animal to animal and batch to batch, but all can be relied upon to increase nitrogen and provide other trace nutrients. However, it does carry diseases and should not be used for edible beds or vegetables that are close to the ground. Every gardener should also be aware that manures contain natural salts, which can build up in the soil with repeated use. Also beware that fresh manures can spread *E. coli* to humans.

Try grasscycling. Lawns are often heavily fertilized, sometimes with negative effects on the environment. Fertilizing the lawn with its own clippings can protect the environment and improve lawn health at low cost. (For more on grasscycling, see page 55.)

Words from the Wise:

Build Your Soil with Cover Crops

Cover crops add nutrients to the soil both through their root systems and by being cut when green and turned into the ground. Sunol gardener Jim O'Laughlin uses a mix that includes vetch, fava, field beans, and oats. Three out of four of these plants are members of the pea family, a group known for fixing nitrogen—that is, they draw nitrogen from the air and incorporate it into their bodies, much as we humans do with oxygen. Some of this nitrogen is transported to the plants' root system and, eventually, once the plant dies, is released into the soil. In the spring and summer, O'Laughlin mows the cover crops, then tills them into the soil. In some cases, he leaves the cuttings on the ground, creating a mulch over which spreading plants such as squash can grow.

Tip: Obtaining Compost

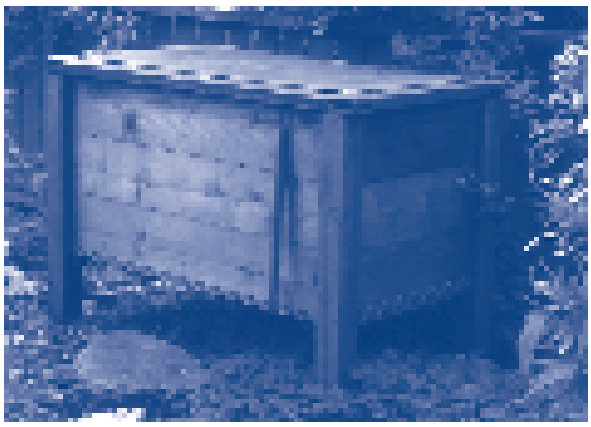
Homemade compost is usually the best kind, of course, but there may be a time when you need more than you can generate on your own. Commercial compost is available at most nurseries; so are various manures.

Many municipal waste services also collect organic materials and recycle them — contact your service provider for more information.

Indicators of Quality Compost

- Dark brown color.
- Sweet, earthy smell.
- Small, fairly uniform particle size.
- No weed sprouts.
- Composted items are no longer recognizable.
- The producer can tell you the peak temperatures (and how long the compost stayed at those temperatures).
- A nutrient analysis is available from the producer upon request.
- Compost is certified by the US Composting Council's (USCC) Seal of Testing Assurance (STA) program.

Use slow-release fertilizers. Though they can be more expensive, fertilizers such as Mag-Amp or polymer-coated urea are worth the investment and ultimately are more effective because they release nutrients over time instead of all at once. This helps prevent runoff and leaching of these nutrients into groundwater. Avoid fast-release fertilizers.



Compost fruit and vegetable trimmings at home to make your own worm castings.

Leaves and clippings rank six out of ten of the most prevalent materials found in the state's waste stream. In Alameda County alone, plant debris accounts for almost 10% of what is thrown away annually. Most, if not all, of this green waste could be recycled for use as mulch.

Any material evenly spread over the surface of the soil is a mulch. It may have a humble name, but mulch is great stuff. By reusing local materials such as tree prunings, brush cuttings, grass clippings, and leaves, we maintain natural patterns of nutrient cycling in our own yards. Mulch will help you create beautiful, healthy landscapes that cost less and require less maintenance. Mulch can:

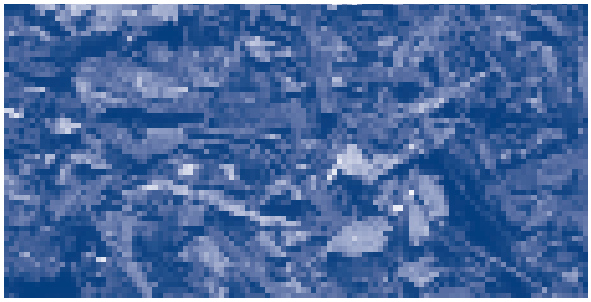
- retain soil moisture
- moderate soil temperature
- suppress weeds
- prevent erosion
- prevent soil compaction
- conserve landfill space
- improve soil life and health

Mulch Basics

Strictly speaking, inorganic materials such as gravel and crushed rock can also be used as mulch. Bay-Friendly Gardening emphasizes the use of plant materials as mulch because as they break down, they contribute to the health of the soil.

Fine vs. coarse mulch. Fine mulches decompose more quickly and need to be replenished more often than coarse, woody mulches. Coarse mulches are better at preventing weeds; finer mulch is a better soil conditioner. Fine mulch typically has a particle size of a half-inch or less.

How thick a layer? How much mulch you lay down depends upon the type of mulch and your purpose in using it. In general, a 2-4 inch layer of mulch material will be sufficient. For weed control, use a coarse mulch such as wood chips and



spread a 4-6 inch layer. For a finer mulch such as compost or shredded leaves, apply no more than 2 inches.

Recycled Mulches

Tree prunings, brush, grass clippings, and leaves that are chipped or shredded are called *recycled mulches*. They are the best mulches to use because they are made from local organic debris. Green waste ranges from clean wood chips of a uniform size and color to mixed plant debris of various sizes and colors. Brief descriptions of the most common green waste mulches are given below.

Chipped or shredded wood from used pallets and lumber. This is mulch made from untreated lumber with nails and other metal removed prior to chipping or shredding. The pieces are sometimes dyed; undyed chips will age to a soft gray. This coarse, long-lasting mulch contains fewer nutrients than mulch made from tree trimmings. It need only be replenished every 2 or 3 years.

Chipped or shredded wood from trees. Can be made from most trees (though see the precautions on page 54 about how to avoid spreading Sudden Oak Death and other diseases). Depending on the tree, the wood will age to brown or gray. This coarse mulch will also last 2 to 3 years. The best source is arborists and tree trimmers who, when they have them, usually give chips for free. The catch is catching these folks at the right time. Call your local tree businesses to let them know you'd like a load when they're working in your area. Alternately, if you hear the buzz of chainsaws in your neighborhood, find the site and ask if there will be any wood chips available.

Benefits of Mulch . . .

Recycled Local vs. Forest Compost and Mulch Products

Many mulches and compost products are made from lumber and paper mill byproducts and have long been sold commercially but are best avoided if possible. Rather than being local, these composts and mulches support distant forest industries. They are relatively expensive and do not supply as many nutrients to the soil as compost and mulches made from local, urban, mixed plant debris. Local, recycled compost and mulches reduce negative transportation impacts of energy consumption and pollution, create markets to recycle local materials, and often produce a product that more readily breaks down into soil nutrients. Ask your local nursery where their mulch and compost comes from and if it is a forest product; ask them to stock recycled compost and mulch from local sources.

Pine needles. Pine needles are slightly acidic, but don't significantly impact soil pH. This mulch easily lets water through to the ground, and its red color (when dry) can nicely offset plantings. It is fairly coarse and long-lasting. Use with caution around some structures since dry needles can be flammable under certain conditions.

Leaves. Use all kinds, from trees and shrubs, as they are rich in mineral content. Let oak, beech, and sycamore leaves lie where they fall, to return nutrients to the soil. Chop other leaves with a mower — especially maple, birch, and elm leaves, which tend to form a mat that blocks the passage of air and water. Leaf mulches break down quickly and will need to be replenished annually. Use your own or beg bags of leaves from neighbors.

Mixed green waste. A combination of any or all of the above, plus chipped brush and other plant trimmings, mixed green waste is a great way to recycle all the vegetative odds and ends you've got lying around. Because of the leaves and green materials in this mulch, it adds extra nutrients to the soil. It also breaks down quicker than a stiff mix. If you've got a chipper/shredder, make mulch at home, but avoid introducing weed seeds into it.

Compost. This dark, rich, crumbly stuff is very soil-like. An inch or two on top of your garden beds will make the microbes happy. Compost breaks down fairly quickly; plan to replenish annually. This is a fine mulch that probably will not control weeds, since seeds can germinate in it. To prevent this, lay down compost, then spread wood chips on top. Commercial compost is available from nurseries, municipal waste agencies, and large-scale suppliers such as American Soil Products. Better yet, make your own. (For more information on buying compost, see Obtaining Compost on page 51.)

Grass clippings. The best place for grass clippings is on the lawn. If they are too long for the lawn, use them elsewhere as a fine mulch. Mow before weeds go to seed and distribute clippings in a thin layer to prevent matting. Avoid using clippings from invasive turf species such as kikuyu. Also avoid using pesticides that can contaminate mulch. Picloram and clopyralid are especially resistant to decomposition. Grass clippings are high in nitrogen, break down quickly, and can be reapplied frequently.

Tip: Calculating How Much to Apply

- One cubic yard covers 108 square feet, 3 inches deep.
- Six cubic yards cover 1,000 square feet, 2 inches deep.

Where and How to Use Mulch

Mulch can be a decorative element in your garden. It can be used to define garden beds and provide contrast to plantings and buildings. While mulch materials vary, most give the garden a tidy, well-cared-for look.

Put mulch under your trees. Mulching under trees mimics nature and minimizes competition from grass for water and nutrients. Young trees establish better and grow stronger roots under mulch than in bare ground. To prevent rot or disease, start mulch 6 to 12 inches away from the base of the tree. Extend mulch to the tree's drip line.

Put mulch along edges and around poles. Maintenance and weed control is easier when there's a band of mulch around poles and other structures.

Mulch shrubbery beds with small cuttings and leaves. As you are pruning, clip branches into smaller pieces and sprinkle them on the ground. Leaves can also be distributed at the base of shrubs and perennials.

Leave grass clippings on the lawn. Clippings on the lawn build lawn health. (See Grasscycling on following page.) If you have too many for the lawn, hide grass clippings under a broadleaf groundcover or low-growing shrubs. Evenly disperse clippings over the canopy, then rake lightly so they settle to the soil surface.

Keep mulches on top of the soil. Any wood material that is incorporated into the soil will temporarily inhibit the soil's ability to supply nitrogen to plants. To prevent nitrogen drag, do not turn woody mulches into the soil.

Remove weeds and water thoroughly before laying down mulch. You'll get the best weed control when you weed before spreading mulch. And it is easier to wet the soil before applying mulch than after.

About Sudden Oak Death

Sudden Oak Death kills tanoaks and other oak species by infecting the tree trunk. It affects the leaves and twigs of dozens of other forest trees and shrubs but does not necessarily kill them. Bay trees, Douglas fir, and rhododendrons are all hosts for SOD — disease-carrying spores infect their leaves. The disease is transmitted to more susceptible species by wind-blown rain.

If you have uninfected oaks on or near your property, do not accept oak-tree wood chips without confirmation that the tree was free of SOD. For more information, call SODBusters at (866) SOD-7411 or visit the web site of the California Oak Mortality Task Force at www.suddenoakdeath.org.

Precautions

In moving any kind of garden material, there is always the risk of transporting weeds and diseases. It is every gardener's responsibility to take steps to reduce the spread of pest plants and pathogens.

If you are getting a pile of chips from a tree service, ask the following questions, and reject any chips you feel may be suspect:

- What kinds of trees or shrubs do the chips come from?
- Is there anything mixed with the chips?
- Is there any likelihood of weed seeds being present?

To prevent the spread of disease, follow these general rules:

- Keep mulch away from tree trunks and the crowns of woody ornamentals.
- Keep mulch on the soil surface.
- Consult an arborist to determine whether or not a tree is diseased before cutting it down.
- In general, if trees are clearly diseased, avoid using their prunings for mulch unless they have been composted to kill disease-causing organisms.

As its name suggests, grasscycling is a form of recycling — it means leaving your grass clippings on the lawn. The clippings quickly decompose, releasing their nutrients back into the ground.

Grasscycling fertilizes the soil and improves the health of your lawn. While some gardeners believe that grasscycling can cause thatch, this is not the case. Nor is it true that grasscycling promotes turf diseases. Grasscycling promotes lawn health by increasing nutrient cycling and supporting a healthy soil fauna.

Grasscycling will save you time and money by reducing mowing time, cutting disposal costs, and lowering fertilizer costs. It also benefits the environment by saving water, reducing fertilizer runoff, and conserving landfill space.

Grasscycling is Easy

Making the transition to grasscycling is simple: stop collecting the clippings. Take these few steps and you'll be on your way.

Mow often. Mowing frequency depends on the season, but a general guideline to follow is the one-third rule. Mow often enough that no more than a third of the grass blade is cut. When the grass is tall, this means raising the mower deck to the highest setting, then gradually lowering it over the next few weeks of mowing. The shorter the clipping the faster it decomposes.

Mow when the grass is dry. Dry clippings can be evenly distributed between the living blades of grass, where they will filter down and disappear from view.

Maintain your mower. Keep the mower deck clean and blades sharp. A clean cut keeps grass healthy by limiting water stress, lowering the chance of disease entry, and minimizing brown tips.

Leave the clippings on the lawn! You don't need special equipment for grasscycling. Simply remove the bag from your mower. For the avid grasscycler, or for owners of rear-discharge mowers, consider these options:

- Find a mulching retrofit kit. It includes a mulching blade and block for the discharge chute.
- Use an electric mulching mower. These are designed with a special blade that repeatedly chops the grass blades into small pieces.
- Use a push reel mower. This offers a non-polluting solution — powered by you!

A Word in Favor of Push Mowers

There's no denying that using a power mower can be a satisfying and enjoyable experience. It's quick and effective. It gets the job done.

A push mower will also get the job done, and it offers more subtle satisfactions, such as peace and quiet. Power mowers create an impenetrable wall of sound around the user and often reach the ears of neighbors two or three doors away. The gentle rasp of a reel mower harms or offends no one. One can hear birdsong over it.

Push mowers also protect our health. Per hour of use, gas mowers emit 11 times more pollution than late-model cars. Reel mowers emit nothing. The person pushing it, on the other hand, might break a healthy sweat.

Benefits of Grasscycling…

Words from the Wise:

Grasscycling is Green

Master Gardener Marla Lee used to put her grass clippings in the compost bin. Now she leaves them on the lawn. She says she likes her compost better without the clippings and she sees real improvements in the condition of her lawn. "I do believe in grasscycling now for greening up the lawn and keeping it healthy," she adds. "I read about it for years, I finally tried it, and I believe in it."

Other Natural Lawn Care Techniques

The lawn can be the most time-consuming part of the yard to maintain. Take these simple steps to make lawn care easier and more pleasurable.

Water deeply. Deep, infrequent watering produces a deeper, more extensive root system, which enables turf to resist disease and stress. Overwatering causes lawns to grow faster and require more mowing.

Fertilize appropriately. Lightly apply an organic fertilizer or slow-release synthetic fertilizer that allows the grass to absorb nutrients efficiently. Fertilize once a year in the fall.

Topdress with compost. An excellent practice is to aerate and then spread a mixture of fine finished compost into the holes made by the aerator.

Reduce the use of pesticides, soluble fertilizers, and "weed and feed" products. Though we want our lawns to look good, we also want them to be safe places for children and pets to play. Reducing or refraining from the use of fast-release fertilizers and pest control products creates a safer and healthier environment for all living things. Target problem weeds with hand weeding or, as a last resort, spot-spraying.

Minimize lawn areas. If the lawn is a must-have for you, keep a smaller one as a picnic area or a play space for children. Grass grows best in sunny areas with well-drained soil.

Consider planting something besides grass, especially on steep slopes, in shady areas, and near streams and lakes. Substituting a native grass such as red fescue for conventional turfgrass, planting a drought-tolerant groundcover such as woolly thyme, or lining paths and garden rooms with wood chips are just a few of the possibilities.

Functional Lawn Alternatives	
Achillea millefolium	Yarrow
Bouteloua gracilis	Blue grama
Carex divulsa (aka.C. tumulicola)	Berkeley sedge
Carex pansa (aka C. praegracilis)	Pacific dune sedge
Chamaemelum nobile	Chamomile
Dymondia margaretae	Silver carpet
Festuca idahoensis	Idahoe fescue
Festuca rubra	Red fescue
Fragaria chilensis	Beach strawberrty
Fragaris vesca	Woodland strawberry
Melica torreyana	Torrey's melic
Nasella lepida	Foothill needle grass
Nasella pulchra	Purple needlegrass
Nepeta racemosa	Cat mint
Thymus sp.	Thyme
Trifolium repens	White clover

That water conservation is a necessary part of life in California is broadly understood. Less well-known is the fact that residential landscapes, which account for at least 30% of the water used in urban areas, are routinely overwatered. Aside from simply wasting water, overwatering contributes to 80-90% of plant diseases. Most gardeners use about 40% more water than they need.

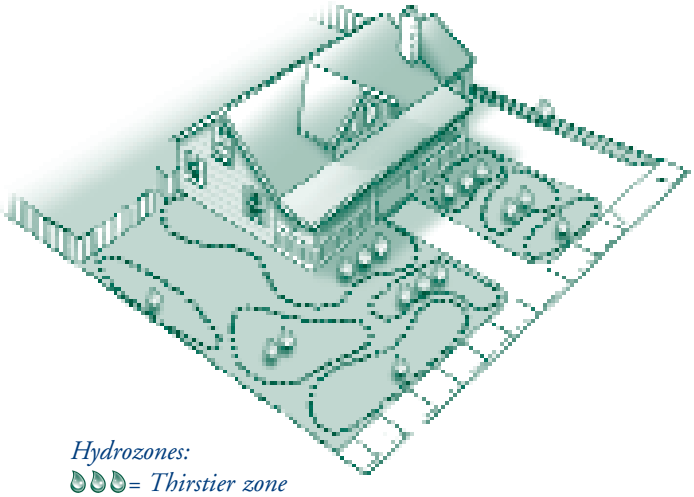
Water Conservation and Bay-Friendly Gardening

Conserving water is a natural part of Bay-Friendly Gardening. Choosing locally adapted plants is one important component; the Bay-Friendly Gardener can also use the techniques described below to make the most of this precious resource.

Use locally adapted plants. Plants that are well suited to conditions in the Bay Area should be the principle building blocks of your Bay-Friendly Garden. They are adapted to the soil and weather, are generally pest- and disease-free, and thrive with less water and less work. They are colorful and make strong additions to your garden.

Learn how much water your plants need. General information about a plant's water needs should be provided when you buy it. Gardening reference books can provide more detailed information. Using this knowledge, begin to notice how your plants respond to the water you give them. Look for signs of stress, such as leaf drop and leaf color change, which can occur from either too little water or too much.

Group plants by water needs. This irrigation design, called *hydrozoning*, groups plants by their water, soil, and exposure needs. One common strategy is to put the thirstiest plants near the house, where they're easy to water and will show best, and create drier zones as you move toward the perimeter of the property.



Hydrozones:
= Thirstier zone
= Drier zone
= Dry zone

Water according to need. The amount of water a plant needs is not absolutely fixed — it changes over the course of the seasons. Day length, temperature, rainfall, and winds all influence how much you should water and how often. Turn off fixed systems during the rainy season.

Monitor your soil. Soils influence a plant's water needs, since their water-holding capacities differ. Use a spading fork or soil-sampling tube to examine the ground before and after you have watered. Feel the soil for moistness. Look to see how far below the surface the moisture extends. The goal is to water the entire depth of the root system.

Use compost to create drought-resistant soils. The organic content of soil affects its ability to hold moisture. Adding compost to your soil will increase its permeability and water-holding capacity. Once or twice a year, spread 2 to 4 inches of compost over the soil and then dig it into the top 6 to 12 inches of the bed.

Benefits of Water Conservation . . .

Use mulch to prevent water loss. In addition to adding organic matter to the soil, mulch reduces the amount of moisture that soil loses through evaporation and plant transpiration, moderates the temperature of the soil in both summer and winter, protects irrigation components from the elements, and prevents weed growth. Depending on the type of mulch used, apply a 2- to 4-inch layer on all open soil. Mulch should never touch the trunk or stem of any plant — leave open space around the crown of each plant.

Water to encourage deep root growth. Deeply rooted plants are better able to withstand the vagaries of wind and weather. A general rule of thumb is to water enough to wet a plant's entire root zone. With the exception of lawn, deep, infrequent irrigation is most beneficial for plants. Shallow, frequent watering is detrimental. It encourages shallow roots that are vulnerable to hot weather because they dry out very quickly.

Make every drop of irrigation water count. The best time to water is in the early morning. The air is calm then, and your plants will not be left with standing water on the leaves overnight, which can promote disease. Be sure that all water falls on soil and plants, not sidewalks or other impervious surfaces. Also, give attention to how quickly your soil absorbs water. If puddles form on the soil surface, stop watering and wait until the water has been absorbed. Repeat this process until the soil is wetted to the appropriate depth. If you have an automatic system, irrigation controllers allow you to break your watering times into smaller intervals. Observe your irrigation system in action and regularly check it for leaks.

Control weeds. Weeds compete with other plants for nutrients and water in the soil. Eliminating weeds from garden beds and lawns will make more resources available for your chosen plants. A thick layer of mulch is the best weed deterrent.

Minimize the lawn. Lawns are heavy water users. Keep yours to a minimum, reserving it for children's play areas or picnic areas in the backyard. Use lawns as an accent rather than as the foundation of your front landscape, and always place a minimum 18-inch planted buffer between the lawn and sidewalk or driveway to minimize runoff. Do not keep or plant lawns on slopes.

A Brief Introduction to Irrigation

Some gardeners never water. Having established a garden with native and/or drought-adapted plants, they work the garden during the rainy season and into spring; then, as the plants become quiescent during the dry time, so do the gardeners. This is a fine way to go. Many gardeners, however, prefer to irrigate for at least some part of the year.

When it comes to watering, the gardener has two main choices: watering by hand or using an automatic system. For large yards, a system will make life easier. For smaller yards, manual watering is more efficient. Hand-waterers use 34% less water than those with automatic irrigation.

Drip Irrigation

Drip irrigation is the most water-conserving method of irrigation. It delivers slowly over a long period of time to targeted areas. There is no runoff and little water is lost to evaporation. One criticism of drip is that it requires a good deal of monitoring; nonetheless, a properly functioning drip system produces the healthiest, best-looking garden.

If you've opted for a system, you'll have both drip and mini-spray emitters to choose from. If you choose a system that delivers to both spray and drip, they must be on separate valves, as they require different pressures and run times to operate efficiently. A drip system should have its own dedicated valve; the setup also includes piping, filter-flush valves, and regulators. For more information regarding drip systems, get a copy of *Drip Irrigation Guidelines,* published jointly by the East Bay Municipal Utility District and the Contra Costa Water District and available free from EBMUD.

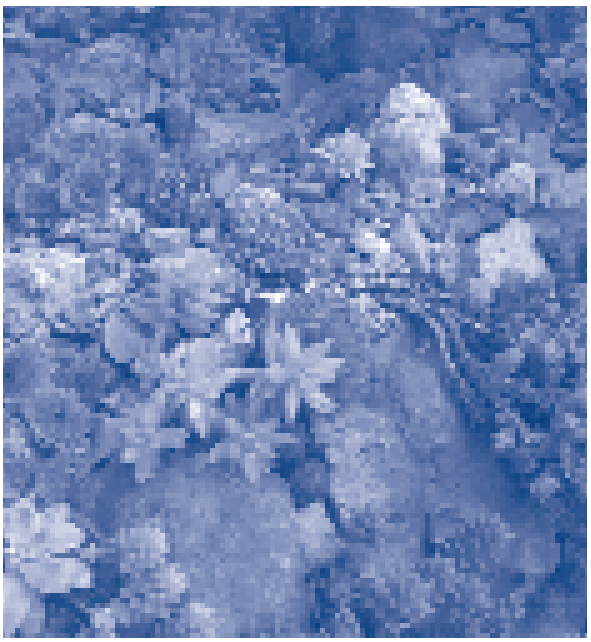
If you're watering by hand, use soaker hoses to do the dripping. Choose between flat hoses with holes on top and round "ooze-type" hoses that gently release water over their entire surface.

Sprinklers

While drip emitters deliver water in gallons per hour, sprinklers flow in gallons per *minute.* They deliver water fast and send it far. Because of this, sprinklers should be used with great care. To prevent runoff when operating sprinklers, break up the total run time into shorter intervals, with time in between for absorption into the soil.

When you have a fixed system, be sure that sprinkler heads are placed to avoid overwatering, underwatering, and water falling in the wrong place. Never mix fixed spray heads with rotors or impact heads on the same valve; they require different run times and pressure to operate efficiently. Lower the volume of water coming through the hose or system and target your watering areas, much in the way one would with a drip system.

To further control water delivery with sprinklers, install a timer — but remember that this tool is only as good as you are. Learn how to use it to your best advantage. Even a simple timer for your spigot, used correctly, can be a water-saving tool.



Words from the Wise:

Rainwater Collection Using Reclaimed Materials

When Oakland gardeners Grant Minix and Mike Geltz moved into their fixer-upper in East Oakland, they found, among other things, two 50-gallon metal barrels had been left behind. Looking for a way to reuse them, Minix and Geltz ran flexible rainspout tubing from the eaves of the garage into the barrels and began to collect rainwater. They have since added a third barrel — a 30-gallon plastic bin they got for free. It once contained olive oil — Minix says that stores like Whole Foods and the Berkeley Bowl routinely have such empty bulk containers, and that they want to give them away.

Tip: Understanding Native Plants' Water Needs

Many gardeners new to native plant make the mistake of thinking they shouldn't be watered. Generally speaking, this is not the case. Just like any other garden plant, natives have cultural preferences based on where they grew in the wild — native plants that are found beside streams, for example, are going to require moisture and shade while shrubs that occur in hot, dry chaparral will be more comfortable in the sun.

Similarly, the garden itself is a specialized environment where a plant's behavior and needs will be subtly changed. Longtime native-plant gardener Jake Sigg has written that natives "frequently need a bit more water in cultivation than in the wild." He advocates "extending the rainy season into May or June, and starting to wake the garden in autumn by commencing irrigation in October. This supplemental watering should be on the light side," he adds, "not the heavy irrigation customary in English-style gardens." It's also true that new plantings—whether native or not — may need a bit more water at the outset, to get established.

Contributors to gardening literature generally agree: pruning is one of the most misunderstood gardening tasks. If you are fond of plants, however, you will find that pruning is not so hard. It can be a delightful exercise in getting to know your plants — and working with them to enhance their appearance. Bay-Friendly Gardening recommends a structural approach to pruning that emphasizes generating the least amount of waste.

Pruning for Plant Health

Much pruning is only necessary because of other gardening choices we make. Strategic, structural pruning to improve plant health can mean less pruning.

Select slow-growing species. Flashy, fast-growing trees and shrubs are often shallow-rooted, prone to wind damage, and short-lived. They require more maintenance in general and their quick growth, in particular, requires more pruning.

Anticipate the plant's mature size. If you think at the outset about the height your plants will finally attain, you won't end up in the unfortunate position of having to top off trees or shrubs that have grown too tall. Similarly, consider the mature plant's breadth. Give your plants adequate room to grow, and they'll need less pruning.

Go easy on the fertilizer. Most perennials, and California natives in particular, don't need fertilizers. The extra growth that these products promote inevitably leads to more pruning.

Keep wildlife in mind. Birds need spots to perch. They also appreciate berries and seeds left on the plant. Wait to prune or leave some plants unpruned each year.

Words from the Wise: Look Before You Clip

Oakland resident Ann Hutcheson-Wilcox had a perennial that, for several years, she refrained from cutting back. She and her children had watched swallowtail butterflies using the plant and they wanted to give the insects full play. "It's important to pay enough attention to *not* prune," says Hutcheson-Wilcox, "if you've got something there that's special and fleeting."

Pruning for Plant Structure

The following guidelines were written with perennial shrubs and small trees in mind. For anything over about 15 feet tall, consider hiring a professional to do the pruning.

Take out the dead wood first. This is an easy way to start working with the plant. You can start at the bottom of the plant and move up, selectively clipping. For large shrubs, reach into the plant, trimming from the interior first. Take out branches that rub or cross each other. Begin to discern the plant's form and how it could be shaped by pruning.

Pay attention to a plant's growth patterns. To prune is, essentially, to direct a plant's growth. A plant will sprout from just below where it is cut, or it will put more energy into growing the limbs the gardener chooses to retain. Depending upon where a gardener prunes, he or she can force a plant to either grow tall and straight or bush out laterally.

Benefits of Pruning . . .

Avoid shearing. According to the *Sunset Western Garden Book,* shearing is "the only form of pruning that could be called indiscriminate." It also creates unnecessary waste. In addition, sheared hedges can be a greater fire hazard, as their interiors contain so much dead wood.

Avoid topping. The practice of topping — cutting main limbs off to stubs — is often used to shorten tall trees and shrubs. The growth that follows is a profusion of slender, upright branches, which sprout from just below the cuts, making the plant look as if it's wearing a toupee. Besides destroying its natural form, topping can compromise a plant; the new branches are but weakly attached.

Prune plants by thinning instead. Thinning selectively removes branches to open the plant to more sunlight and channel its growth into chosen stems and branches. The focus is on cutting branches back to where they originate, rather than cutting mid-stem.

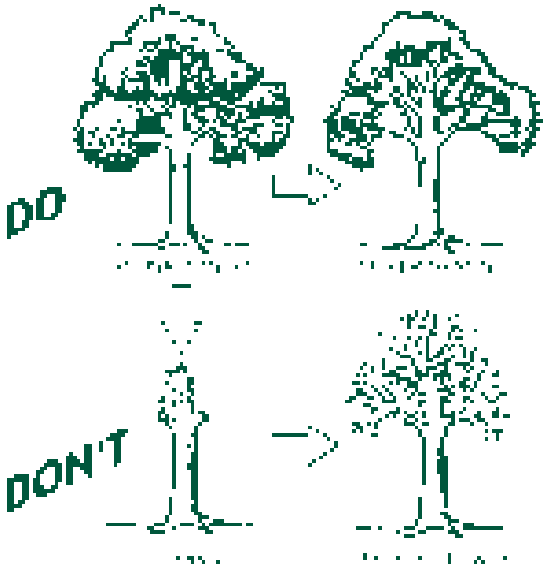
Start pruning early. Don't wait until a shrub or tree has reached something close to its full stature before beginning to prune. Thin young trees and shrubs as they grow. A few well-chosen cuts each year will save you time and energy, and prevent greater waste, as the plant matures.

Cut at the right time. When to prune depends upon your goals and the plant itself. Thinning can be done in any season. To promote flowering, prune after a plant has bloomed. To provide for the needs of wildlife, wait until well after berries and seeds have formed.

Take your time. Do each pruning job in two sessions instead of one. Step back from the plant to see the effects of your work as you go. Enjoy the process.

Tip: Mulch Your Prunings

Whether you're doing a bit of snipping and clipping by hand or you've hired someone with a chainsaw to make major cuts, your prunings can be converted into mulch. Leave the mulch where you make it or distribute it elsewhere in the garden.



Prune selectively and avoid lopping. Adapted from illustration by Craig Farnsworth in Sustainable Landscape Construction.

Every gardener has to contend with unwelcome guests. Persistent dandelions in the driveway or snails that make midnight raids are just two amongst the not-so-heavenly host of interlopers a gardener can encounter. It can feel as though it's us against them out there, and often it seems as if *they're* winning. To gain the upper hand against pests, be they plant or insect, you must be more persistent than they are, and you must be strategic. Keeping pests to tolerable levels (rather than trying to eliminate them completely) can be part of this; using more than one means to control pests is another effective strategy.

Integrated Pest Management (IPM)

Taking a more holistic approach is the foundation of Integrated Pest Management. The suite of practices now known as IPM began as "integrated control" in the 1950s, when it was recognized that preserving some insects (the "beneficials") could boost the effectiveness of pesticides applied to walnut trees in California. Today, Integrated Pest Management is used around the globe to contend with a variety of organisms that threaten the well-being of agricultural crops, garden plants, and households.

Integrated Pest Management considers context. It looks at the whole picture and stresses solutions that cause the least environmental damage. Whether you're dealing with weeds or insects, rust or blight, the first step in IPM is gaining an understanding of the problem. (Some suggestions for how to do that are provided on the following page.)

Beneficial Insects and Plants for Controlling Major Pests

Attract these beneficial insects	By planting these species
Bigeyed bug	*Polygonum* sp. (Silver Lace Vine) Native grasses
Hoverflies	*Achillea* sp. (Yarrow) *Asclepias fascicularis* (Narrowleaf Milkweed) *Baccharis* sp. (Coyote brush, Mulefat) *Ceanothus* sp. (California Lilac) *Eriogonum* sp. (Buckwheat) *Prunis ilicifolia* (Hollyleaf Cherry)
Lady beetles	*Achillea* sp. (Yarrow) *Asclepias fascicularis* (Narrowleaf Milkweed) *Atriplex* sp. (Quailbush, Saltbush) *Ceanothus* sp. (California Lilac) *Rhamnus californica* (Coffeeberry) Native grasses *Salix* sp. (Willow)
Lacewings	*Prunus Ilicifolia* (Hollyleaf Cherry) *Ceanothus* sp. (California Lilac)
Minute pirate bug	*Achillea* sp. (Yarrow) *Baccharis* sp. (Coyote brush, Mulefat) *Eriogonum* sp. (Buckwheat)
Parasitic & Predatory Wasps	*Achillea* sp. (Yarrow) *Aesclepias fascicularis* (Narrowleaf Milkweed) *Eriogonum* sp. (Buckwheat) *Myoporum* sp. (Boobialla)
Tachnid flies	*Achillea* sp. (Yarrow) *Eriogonum* sp. (Buckwheat) *Heteromeles arbutifolia* (Toyon) *Myoporum* sp. (Boobialla) *Rhamnus californica* (Coffeeberry)

ADAPTED FROM CORNFLOWER FARMS CATALOG, 2001

Benefits of Integrated Pest Management . . .




Notice what's going on. Make daytime sweeps and nighttime forays into the yard. When you're pulling weeds or turning the compost, do a little poking around. Play garden sleuth. Where are you seeing damage? Check the underside of those leaves. Look around for who might have done it. If there doesn't appear to be an insect problem, theorize other causes — but don't give up if you don't expect to come up with an answer right away. Observation is best practiced with patience.

Get to know the players — learn their habits and needs. A small white grub that looks entirely anonymous could turn into the kind of beetle who likes to eat slugs for breakfast. Likewise, knowing sow thistle by name and bloom time will make it easier to prevent its return next year. Field guides and gardening books are your aids here, as are Master Gardeners and county extension agents.

Avail yourself of the experience gained by others. It's very likely that someone else has struggled with the same problem you have, and that they've written about it. No one resource will give you everything you need, so consult several. It's worth the time and effort. As one garden writer says, "an hour spent reading about control strategies is likely to save many hours of actually pulling weeds."

Learn to live with low levels of pests. One of the most important things in IPM is to figure out how many pests you can tolerate and whether or not the "pest" is actually a problem that needs attention. Lots of aphids on a tree are usually just a nuisance. Lots of aphids on a potted tomato could do the plant in. A few aphids, anywhere in the garden, will provide food for bird and beneficial insects.

IPM Offers Practical Steps for Tackling Pests

Integrated Pest Management takes the very sensible position that completely eliminating a pest is neither possible nor desirable. A healthy garden ecosystem includes a variety of insects, the majority of which are either beneficial to your garden or will have no impact on it. It probably even includes a few weeds. Aiming for something less than total annihilation of all pests means a healthier garden and a more achievable definition of success.

IPM identifies four management strategies for dealing with pests: cultural, mechanical, biological, and chemical. There is no set order in which these should be employed; use as many different tactics from these categories as you can, with the exception of chemical controls, which should be used only as a last resort. The following sections provide examples of how these strategies can be used to deal with two of the major classes of pests — insects and weeds.

Tip: Plant Disease — Check for Other Causes First

Plant diseases are difficult to identify, so do not assume your plant has one based on appearance alone. Use a magnifying glass to look for insect pests that may be causing the damage. Also analyze your maintenance practices to see if they might explain the symptoms. If a disease is still suspected, go to the Sick Plant Clinic on the first Saturday of every month at the UC Botanical Garden — (510) 643-2755 for more information. Or, visit www.mastergardeners.org and ask a local Master Gardener for advice.

Contending with Insect Pests (and a Few Other Ills)

Perhaps it is because insects look so different from humans that so many of us have such a deep antipathy for them. These otherworldly creatures do have faces and eyes, however, and fascinating lives. Many of them also provide valuable services to humankind. Pollination is the best-known of these, but the work of the decomposers who ceaselessly cycle organic matter into forms that other organisms can use is also a huge boon to humanity.

Less than 2% of the insects you encounter in the garden will be pests. Looked at the other way, the vast majority of insects in your yard are *not* harmful — they're either beneficial or neutral. In the interest of keeping them alive, take a targeted, selective approach to dealing with the insects that are pests.

Cultural Controls

These controls are defensive, or preventative, ones. Cultural controls have to do with how you take care of the garden. They are horticultural controls, if you will: improving soil conditions, choosing pest-resistant plants, pruning moderately, watering attentively, and so on will help your plants resist predation.

The right plant in the right place is also an important form of pest control. Plants that are healthy and growing in the right conditions are less likely to be attractive to pests and, if they are attacked, they are in better shape to fend off or outgrow the pests. If you have a plant or plants that are always sickly, consider removing them. They are probably in the wrong place.

Mechanical Controls

With these tactics, which are also called physical controls, the gardener begins to take the offensive. These are direct, but nontoxic, interventions.

Hand-picking is particularly effective against large and slow-moving pests like slugs, snails, caterpillars, and potato beetles. The idea may make some a bit squeamish, but it's not hard to do. Wear gloves if you'd rather not touch the creatures. You can kill them by squashing them or dropping them into soapy water.

Spraying water is a technique best used on sturdy plants that can withstand the force of water under pressure. Bring your garden hose out and direct a fine spray of water to the leaves and stems of plants that are suffering infestation of spider mites and aphids.

Setting traps does not necessarily involve a trip to the nursery or hardware store; rolled up newspaper is an adequate enticement for earwigs, and boards lying on the ground will attract sowbugs and slugs. A shallow cup of beer not only attracts slugs and snails, it kills them. (Also see Controlling Snails and Slugs in Your Garden, pages 68-69.)

Setting up barriers such as mulch has been discussed for dealing with weeds; the same principle can be applied to the control of some insects. Sticky barriers such as Tanglefoot will deter ants from climbing tree trunks and plant stems to reach honeydew-producing insects; copper strips can keep snails out of areas where they are not already established, such as new raised beds. Mesh covers can be used to protect your vegetables from flying insects and slugs and snails.

Words from the Wise: Knocking Back Aphids

Though he doesn't get too many aphids in the garden, Sunol gardener Jim O'Laughlin says he usually finds them in the spring, especially on seedlings in the greenhouse. He washes them off using a mist spray from the hose. "You want a strong mist," he advises, "but not something that's going to break up your plants." On roses, you can use a heavier spray setting; either way, O'Laughlin says, the aphids come off pretty easily.

If the aphids aren't permanently discouraged by this approach, O'Laughlin resorts to insecticidal soap. He uses Safer brand, though it would probably be nearly as effective, he says, to make your own from dish soap.

Biological Controls

These controls make use of parasites, predators, and competitors to help keep down populations of insect pests. These organisms are called *beneficials* — they benefit the gardener. Some natural predators, such as lady beetles and lacewings, can be purchased from commercial suppliers, but the effectiveness of doing so has been questioned. (Introduced ladybugs usually fly away to some *other* home!) A gardener's best bet is to promote the biological control already going on in the garden by learning to recognize resident beneficials, growing plants that will support them, and keeping pesticide use to a minimum.

Compost tea might not immediately come to mind as a biological control, but it is loaded with good organisms that outcompete pest organisms, some of

which can help reduce leaf and root diseases. Many studies are now being conducted to explore new applications for compost tea, such as containing mildew on golf course turf. To make a quick compost tea, leave a shovel-full of mature compost overnight in a bucket of water. Drain the "tea" off in the morning and apply as needed. (To make larger batches, see the instructions on page 50.)

Chemical Controls

Home gardeners should look for pesticides that have low toxicity and break down quickly. Buying in small quantities is also a good idea, so that one can avoid generating hazardous waste. Only least-toxic chemical controls are described below.

Insecticidal soaps have been used against pests for about two centuries. They are effective against soft-bodied insects such as mites and aphids as well as other plant-sucking arthropods like whiteflies. Soap kills only the insects that it touches, so be sure to spray the undersides of leaves as well. Soap does not leave a residue of poison behind, so repeat applications may be necessary.

Horticultural oils kill insects on contact as well, and they work against a broad array of pests, but unlike many chemical sprays, they have no residual impact. Oils are often used against scale, leaf miners, mealybugs, and caterpillars.

Minerals are used primarily to treat fungal diseases and mildew. Sulfur can be used against scab, rust, leaf curl, and powdery mildew. Boron, in its many forms (boric acid, borate, borax), is an effective pesticide against a number of insects. Iron phosphate slug baits are less toxic than other slug and snail baits.

Botanicals are plant-derived insecticides that break down quickly in soil and sunlight. Depending upon the formulation, they can be very concentrated and quite potent when first applied, so they should be used as a last resort. They are effective against many pests, but some botanicals can also be toxic to people, pets and wildlife, fish, and other aquatic species. Pyrethrums, ryania, and sabadilla are the most common botanicals. Avoid synthetic pyrethrums — called pyrethroids — they're often combined with PBO, another synthetic that makes them longer-lived and more harmful to the environment.

Microbial pesticides include *Bacillus thuringiensis,* which is better known as Bt. It is a bacterium that kills a variety of caterpillars and worms, including many non-pest butterflies and moths. Use it with caution.

Contending with Weeds

If there were a Plant Olympics, weeds would be the gold medal winners. They are adaptable and do well in a variety of conditions. Weeds also have very successful reproductive strategies, such as profuse seed production, sturdy underground structures, or the ability to reproduce from their stems and leaves.

Weeds are not without their virtues. They are plants, after all, and they do the same things that other plants do — produce flowers and fruit, provide habitat for some species (though they may eliminate it for others), secure the ground with their roots, loosen heavy soils, add nutrients and organic matter, and so on. And because, like any other organism, they have needs and habits, weeds can also tell us about the place in which they're growing. They can give us clues to soil conditions, moisture levels, and more.

Tip: Composting Your Weeds

Go ahead and compost your annual and perennial weeds, as long as they have no mature reproductive structures such as seeds or bulbs. (Also avoid composting weeds that can resprout from stems, leaves, or other plant parts.) You can even compost these plants in place — lay them on the ground where you have pulled or cut them. If the dying weeds seem unsightly, cover them with mulch. The weeds themselves are good mulch and good fertilizer.

Whether you compost weeds in a bin or in place, keeping them in the garden is good for the garden. Every time you remove organic material from your yard, you are essentially mining the soil. Keeping these materials on site keeps them out of the waste stream and restores nutrients to the soil.

Nonetheless, if given leave to, a weed will assert itself at the expense of other plants. To root out weeds, use the following guidelines and controls.

General Guidelines

Over time, we can change the habitat in our gardens so that weeds will have very few places to grow. Attention to cultural controls as well as to the weeds themselves can make all the difference.

Build good soil to make weeding easier. A loose, friable soil yields weeds easily. Amend your soil with organic material and reap several kinds of harvests. It is also very important to use mulch to suppress weeds and make them easier to pull out if they do sprout.

Manage irrigation to keep weeds down. Use drip emitters to deliver water to desirable plants; avoid using sprinklers that water everything and encourage weeds to keep growing.

Use dense ground covers or thick foliage to shade out weeds. Plants compete for resources — sunlight, water, nutrients. Use this to your advantage in the garden, putting in plants that can compete successfully with the weeds.

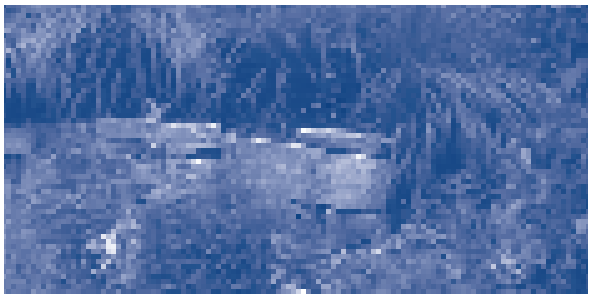
Learn the growth habits and life cycles of your weeds. Plants have different life spans and different ways of surviving. Understanding these is the

Words from the Wise:

Less Watering Means Fewer Weeds

When you choose to grow plants that depend on a lot of water, you could also be encouraging a host of unwanted plants. Weeds are great opportunists—where conditions are favorable, they'll grow. Even in established plantings, more water means more weeds. Consider, for example, a lawn.

"With lawns," says San Leandro gardener Gail Schino, "you just soak them. Water, water, water. I used to spend more time weeding because of all that watering." Schino took out her lawn, she waters less, and, she says, "I enjoy my garden much more."



key to controlling any given weed. Since annual weeds sprout, flower, set seed, and die in a single year, getting rid of them before they produce seeds will reduce your weed problem the following year. Perennials live for a longer time — two to many years. While many generate seeds, they also often rely on underground structures — deep roots, a taproot, bulbs, and so on — to keep them alive from year to year. Getting rid of them usually requires finding a way to kill their underground parts, either by pulling, or cutting, or smothering them.

Prevent weeds from forming seeds. Whether they are annuals or perennials, preventing seed formation will make a huge difference in the number of weeds you have. It is crucial to get to those weeds before they go to seed. If you can't remove them entirely, plants should be at least cut down before they set seed.

Weed when the soil is moderately moist. Trying to pull roots out of dry soil is at best difficult, at worst futile. Removing plants from very wet ground is a muddy mess that harms soil structure. Weed when the soil is moist but not wet.

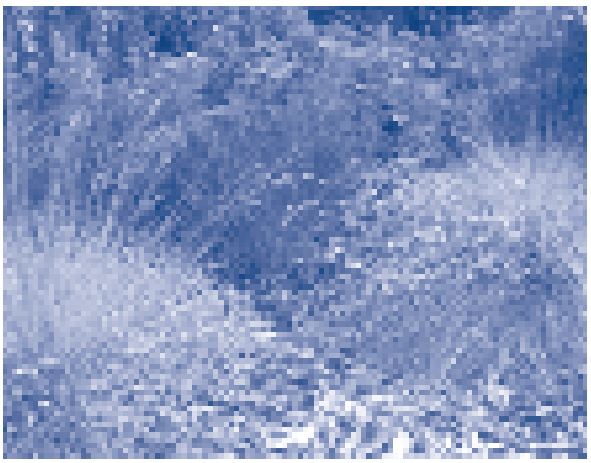
A Few Specific Weed Control Techniques

The ways to tackle a plant are many, and the intrepid gardener should use all that are appropriate to the particular weed. Be persistent and work smart — focus on the weeds that will flower soonest and scale your efforts to the size of the problem. If you have a huge weed patch, for example, hand-pulling will not be as effective as cutting the weeds and covering them. Following is a brief summary of the basic techniques for dealing with weeds.

Pulling weeds usually involves using a tool to loosen the soil and then pulling the plant by hand. Depending on the size of the plant you're working with, a hand fork, spading fork, or mattock can make weeding easier; for big shrubs, a Weed Wrench is very effective and satisfying to use. Wearing gloves is always a good idea, too.

Scraping can help you take out shallow-rooted plants or kill weeds when they're young. The most common tool for this a hoe, which comes in a variety of hand-held and long-handled forms. While scraping is an effective control for both annuals and perennials, avoid cultivating the soil any more than necessary to remove the weeds. You don't want to turn over the soil and bring up new weed seeds, or disrupt the food web in the soil, or damage soil structure.

Cutting down weeds may be necessary if there are extensive weed problems or you're dealing with large plants. Cutting may also be needed to remove bushy overgrowth, such as blackberry vines, before you can remove the roots. Where "soft" weeds such as grass predominate, use an electric mower or weed whacker to keep growth in check and prevent plants from flowering. For vines and shrubs, cut them away with pruners, loppers, or a pruning saw, then dig them out or cover them with mulch.

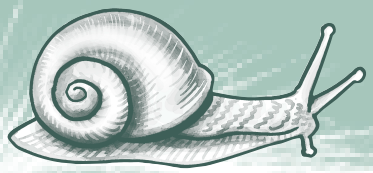


Mulching works in two ways — by blocking sunlight and creating a barrier to growth. It prevents many annuals from germinating. Since perennials have sturdy underground structures, mulch alone is less effective at suppressing them. Used in combination with a barrier such as newspaper, cardboard, or decomposable fabrics (nondecomposable fabrics become both a blight and disposal problem), mulch will keep most perennials down. The best approach is to pull or cut down perennials first, then lay down a barrier and mulch.

Tip: Beware of Weed and Feed

Like the adage about killing two birds with one stone, weed and feed lawn products suggest a certain economy of effort. However, rather than providing one quick fix, weed and feed products spell double trouble. Since weed and feed products are often broadcast over large areas such as the lawn, pesticides are applied to nonweed vegetation and soil — at unnecessary cost to you and the environment. The "feed" part of most of these products is a quick-release fertilizer that can cause a flush of growth which in the short term leads to more pruning and mowing and in the long term can result in soil depletion. Both components — the pesticides and the fertilizers — can also end up contaminating our waterways if the product is applied before a storm or "watered in" to such an extent that water runs off.

Applying least-toxic herbicides. There are a few less-harmful products on the market that can be used in combination with other weed control efforts. Corn gluten meal — a waste product of corn syrup processing — is a fine, yellow powder applied to soil. It suppresses germination of many common annual grasses and broadleaf weeds, but its effect is short-lived, so applications must be carefully timed to coincide with seed germination. Herbicidal "soaps" and acetic acid (vinegar) kill plant tissue that they contact by disrupting plant cell membranes. They are more effective against annuals than perennials — tough weeds resist these herbicides or resprout from roots. In many cases it is just as effective to pull, cut, and mulch as to use least-toxic herbicides because they have to be used again and again.



Case Study: Controlling Snails and Slugs in Your Garden

Are your vegetable and flower seedlings being devoured overnight? Are you finding large, ragged holes in your prized ornamentals? Do you see slime trails across your walkways? If so, your garden is probably harboring snails and slugs.

Detection

Snails and slugs are active mostly at night and on dark, cloudy days. On sunny days, they can be found in moist, shady spots. Look for their eggs in the soil (about an inch down) or under rocks, boards, or plant debris. The eggs are laid in masses of up to 100 and resemble small pearls. When you find eggs, crush them or scoop them into a plastic bag, seal it, and put the bag in the garbage.

Less-Toxic Controls

Keeping down the population of slugs and snails requires persistence. By using a combination of two or more of the following methods, you should be able to reduce their numbers, and keep snails and slugs at acceptable levels in the garden.

Hand-Pick at Night

- To be effective, hand-picking must be thorough and it must be done regularly. Collect nightly until it's hard to find snails and slugs, then check once a week.
- The best time for hand-picking is after 10:00 or 11:00 p.m., when snails come out to feed. You can go out earlier, but you won't find as many.
- A flashlight and a pair of gloves or tongs will make collecting these slimy creatures easier.
- Crush snails completely (otherwise they may recover) or drown them in a pail of soapy water (they survive in plain water). A few dead slug and snail bodies left on the soil surface will attract more snails and slugs and make your collecting easier, but large piles will breed flies. Burying crushed mollusks 3 or 4 inches underground will add nutrients to the soil and avoid fly problems.

Use Barriers

- Before using barriers, hand-pick for a couple of nights. After the barriers are in place, check for snails and slugs caught inside the barrier.
- Wrap a strip of copper (Surefire Slug and Snail Copper Barrier Tape) around a tree trunk, flower pot, or the wooden sides of garden beds or fences. Snails and slugs are repelled by the unpleasant reaction between their bodies and the copper.
- Cover seedlings with small cages made from plastic or galvanized metal window screen. Push the cages into the soil so snails and slugs can't squeeze under.
- Cover rows of vegetables with horticultural fabric (Fast Start, Seed Blanket) that lets in light and water but excludes snails and slugs.
- Use a product like SlugStop (coconut oil soap) to repel slugs and snails. Apply the material in a ring around individual plants.
- Snails and slugs may cross barriers such as diatomaceous earth, lime, sawdust, ashes, etc., especially when these barriers are wet.

Use Traps

- Snails and slugs can be trapped under upside-down flower pots, dark-colored plastic sheeting, and wooden boards. Place these traps around the garden and collect snails and slugs in early morning or night.
- Homemade or commercial pit traps that use beer or yeast mixtures to lure snails and slugs to a drowning death may help, but hand-picking will probably still be necessary.

Encourage Natural Predators

Many common ground beetles kill snails and slugs. Most of these beetles are large (1-2 inches), black, tank-like creatures. They are found in the same moist habitats as their prey: under rocks, boards, leaves, etc. Avoid killing these allies.

Use Iron Phosphate Bait

Chose a bait product carefully. Baits containing methiocarb kill earthworms and beneficial insects.

Baits containing iron phosphate (such as Sluggo, Escar-go, or Worry Free) are safer for children and pets than baits containing metaldehyde. Nevertheless, always keep this and all other pesticides out of the reach of children and pets.

After eating iron phosphate, snails and slugs stop feeding and die within 3 to 6 days. They often crawl into secluded places, so you may not see dead bodies.

Reapply iron phosphate baits every 2 weeks.

Prevention

- Snails and slugs find large expanses of ivy, nasturtiums, and other succulent groundcovers particularly attractive, and they also hide in clumps of agapanthus, lilies, daffodils, and iris. They are less attracted to plants with dry, hard leaves like rhododendrons, junipers, and bamboo. If you can't remove the attractive plants, regularly search them for pests.
- Moisture makes an area much more attractive to snails and slugs. Avoid over-watering and use drip emitters to deliver water only where it is needed. Water early in the day to allow the area to dry out before nightfall.
- Remove any boards and flower pots that you aren't using as traps.

Reproduced from a fact sheet produced by the *Our Water Our World* program, which promotes less-toxic pest control. Written by Tanya Drlik.

Our Water Our World was originally developed by the Central Contra Costa Sanitary District. It is supported by the Bay Area Pollution Prevention Group, the Bay Area Stormwater Management Agencies Association, and Bay Area water pollution prevention agencies.

Our Water Our World has developed a series of information pieces and store displays aimed at educating Bay Area residents about less-toxic pest management. Look for the *Our Water Our World* logo next to products in participating hardware stores and nurseries throughout the Bay Area.

Visit www.ourwaterourworld.org for information on finding pesticide alternatives, buying least-toxic products, identifying bugs, and more. You can also "Ask the Expert" about your personal pest problem.

The vegetation in our cities and towns is remarkably diverse, and from the point of view of some animals, we've been spectacularly successful in creating habitat. The once-migratory Anna's hummingbird has become a year-round resident in coastal California, largely because of the abundance of food sources (both feeders and flowering plants) that humans have made available.

Our residential environments are essentially an open woodland growing over scattered impervious surfaces. This architecture favors certain species, including many of the perching birds, who like shrubs and edges and can easily move between patches of habitat. Terrestrial species have a harder time making a go of it in suburbia, but many persist and, along with their winged brethren, they will gladly make use of your yard if given a little incentive.

Gardening for Wildlife

Many organizations promote gardening for wildlife, and their recommendations have much in common with Bay-Friendly Gardening. They exhort the gardener to (among other things) quit pesticides, embrace bugs, lose the lawn, and use native plants. Most recommend an architecture of low, medium, and high plantings, and most follow tenets set down by the National Wildlife Federation: food, water, places to hide, and places to raise young are what makes wildlife at home in that habitat also known as the backyard, apartment balcony, or patio.

At its root, gardening for wildlife is an attempt to provide for the needs of wildlife. This can be as simple as hanging a bird feeder or as complex as overhauling an entire yard. For most people, the pursuit lies somewhere in between, and typically it involves learning something about the wild flora as well as fauna. To get started, try the following steps.

Take notice of the wildlife that's already present. Butterflies and birds are often more easily viewed from inside the house — and through binoculars. Situate your furnishings so that where ever you spend time regularly, you're next to a window. That makes observation easy and an enjoyable respite from whatever else may occupy you. Also be sure to go outside and play! When you're in the yard, give yourself the time to sit and watch or turn over rocks and investigate.

Use field guides and natural histories to learn more about what you're seeing. Opening these texts is like peeking into some wizard's book of mysteries — the secrets of the world are laid bare, in a language of beauty and poetry. But far from being hidden or arcane, these magical volumes are available to anyone who cares to look. Enjoy them. Make use of them.

Consider the surrounding environment. Your success as a wildlife gardener will be influenced by the lands around you. Creeks or other water bodies, and areas of open space (including vacant lots), will bring more wildlife to your area. Sometimes even a

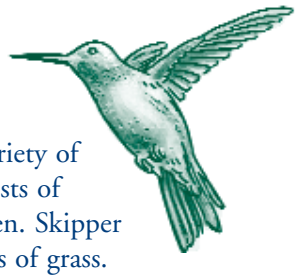
single tree in the neighborhood, such as a willow or an oak, can support a host of species, from humble bugs to haughty raptors.

Consider the needs of wildlife. Food, water, shelter, and places to raise young are the essential elements of wildlife habitat.

Food means all things plant-related: pollen, nectar, berries, seeds, stems, and leaves. It also means bugs; they're the food for other bugs, for birds, for mammals, reptiles, and amphibians.

Moving water attracts more species than still water, but even a shallow basin on the ground, kept clean and refilled regularly, will offer birds a place to drink and bathe. It can also offer frogs and salamanders a place to lay eggs.

To provide shelter for the greatest number of species, diversify the architecture of the garden — that is, select plants that will stand at different heights when mature. Plant different kinds of plants as well — use herbaceous perennials as well as woody ones, plant bulbs, grow grasses, and so on.



Places to raise young means different things to different species. Anna's hummingbirds will use a variety of trees to anchor their tiny nests of spider web strands and lichen. Skipper butterflies lay eggs on blades of grass. Diverse plantings will provide reproductive space for more species. Leave leaf litter in place, use mulch, and allow some open ground.

Use a few extra native plants. Natives provide some of the best food sources for wildlife, particularly at the lower end of the food chain. Some native plants, such as coyote bush, coffeeberry, and oaks, are host to hundreds of species of insects which in turn provide important food sources for other insects, reptiles, amphibians, birds, and mammals.

Grow a diversity of plants. Wildlife gardeners have one advantage over Mother Nature — they can create a super abundance of food sources such as would never occur in the wild. Grow plants with different flowering times, shapes, and sizes. Include plants and shrubs that provide berries. Avoid, however, the one-of-everything approach; many kinds of wildlife, especially pollinators, prefer mass plantings of their favorite food sources.

Continued on page 74.

Flowering Periods of Selected Beneficial Insect Plants

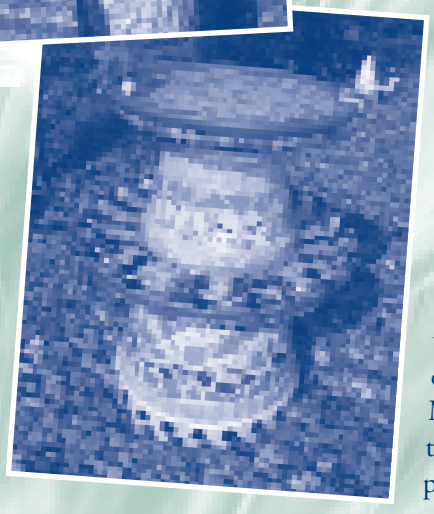
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salix sp. (Willow sp.)	■	■	■	■								
Ceanothus sp.		■	■	■	■							
Baccharis viminea (Mule Fat)			■	■	■							
Achillea sp. (Yarrow sp.)				■	■	■	■					
Rhamnus californica (Coffeeberry)				■	■							
Prunus ilicifolia (Holly-Leaf Cherry)				■	■							
Eriogonum sp. (Buckwheat sp.)					■	■	■	■	■	■	■	■
Sambucus sp. (Elderberry sp.)					■	■	■	■	■			
Heteromeles arbutifolia (Toyon)					■	■						
Myoporum parvifolium (Creeping Boobialla)						■	■	■	■	■		
Asclepias fascicularis (Narrowleaf Milkweed)							■	■	■	■		
Baccharis pilularis (Coyote Brush)	■									■	■	■

ADAPTED FROM CORNFLOWER FARMS CATALOG, 2001.

If You Build It: Gardening for Wildlife in Fremont

When asked how she created her teeming wildlife garden in Fremont, Kathleen McCabe-Martin answers simply, "I planted flowers and trees and shrubs that attract more wildlife." She wanted to increase plant food sources and, she says, attract insects that could be food to birds.

McCabe-Martin recognizes that wildlife includes not just charismatic animals, but humble ones as well. Small creatures, from soil microbes to pill bugs, are a vital part of any garden ecosystem. Even "pest" insects can sometimes be tolerated — McCabe-Martin ignores the aphids on her plants because that way she has more ladybugs.



This Fremont gardener has created an explosion of informal diversity in both her front and back yards. "The neighbors thought I was crazy," she says. They were very nervous about the loose and easy grasses, shrubs, and herbs that McCabe-Martin planted in the front yard. "Now," she concludes, "they come to look at all the flowers."

Something is always in bloom. McCabe-Martin's pink-flowering currant starts to flower by the end of January; then the wild lilac — ceanothus — comes on. "Grasses are popping out at the end of spring," she says, "as well as a lot of bushes. The salvias start at various times and just keep on blooming." In late summer, the bright red flowers of California fuchsia are still brightening the yard, a banner call to carpenter bees and hummingbirds.

McCabe-Martin also plants plenty of spring wildflowers, such as baby blue eyes, sea foam, and tidy tips, that can provide pollen and nectar to early-spring insect foragers. In late spring, another annual wildflower, tansy-leaved phacelia, begins blooming. Its flowers are visited by many species of native bees. California has about 1,500 native bees; there are probably more than 100 different species in the Bay Area alone.

A wildlife garden means more than just a steady supply of flowers, however. Seeds and berries also provide food to wildlife. McCabe-Martin has five feeders in the back yard — mourning doves and squirrels take advantage of the flat-pan feeder filled with corn and sunflower seeds; American goldfinches flock to the vertical feeder loaded with nyjer (thistle) seed.

McCabe-Martin has also chosen plants that produce plenty of berries. California honeysuckle, a twining native vine, produces pretty pairs of scarlet fruit eaten by purple finches and spotted towhees. And cuttings of wild grape from a nearby creek, which McCabe-Martin simply slipped into the ground along the fence, produce shiny berries that provide sustenance to birds and mammals alike — not to mention spectacular fall color that is a feast for any gardener's eye.

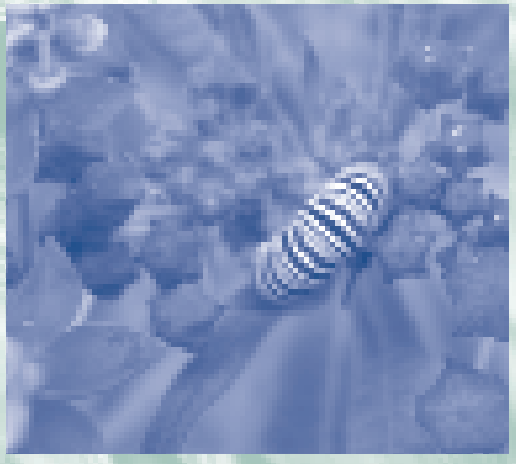
McCabe-Martin also keeps five birdbaths in her backyard and two in front. Water is the single most important element of a wildlife garden — it alone will bring new creatures into the yard and help sustain the ones already there.

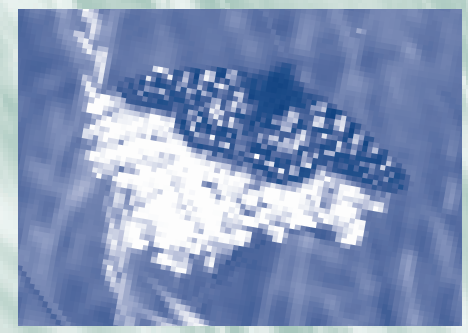
If You Plant it, They Will Come

To help build diversity in her yard, Fremont gardener Kathleen McCabe-Martin grows herbaceous perennials—plants that live for more than a single growing season but aren't woody. McCabe-Martin grows one such plant, cow parsnip, at the edge of a wildflower meadow in her backyard. Reaching heights of more than six feet in a single season, cow parsnip dies back by the end of summer, then sprouts again in the spring. It blooms annually, putting forth broad platforms of small flowers that attract a host of beneficial insects.

Like many herbaceous perennials, cow parsnip relies on underground structures—in this case, a sturdy taproot—to remain alive all year. Plants that have varied ways of living help vary a garden's structure, both above and below ground, and they provide varied resources for animals in the garden.

Whether it is for a seasonal stopover or setting up house, including plants in your garden that provide food, shelter and places to raise young will entice wildlife visitors. Consider who you are most interested in providing habitat for and then learn more about their habits and needs. For those captivated by Bay Area butterflies, the plant list on this page provides a selection of host and nectar plants.





Butterfly Attracting Plants	
Antirrhinum majus	Snapdragon
Asclepias sp.	Milkweed
Aster chilensis	California aster
Buddleja davidii	Butterfly bush
Carex tumicola and others	Carex
Ceanothus spp.	California lilac
Erigeron spp.	Fleabane
Eriogonum spp.	Native buckwheats
Festuca californica, Melica californica and others	Grasses
Lantana	Lantana
Lupinus sp.	Lupines
Malacothamnus sp.	Mallow
Monardella villosa	Coyote mint
Nepeta spp.	Catmint
Penstemon spp.	Penstemon
Phacelia spp.	Phacelia
Rhamnus californica	Coffeeberry
Rudbeckia spp.	Rudbeckia
Salvia spp.	Sages
Sedum spp.	Stonecrop
Sidalcea malviflora	Checkerbloom
Solidago californica	Goldenrod
Tagetes lemmonii	Mexican Bush Marigold

Build a diversity of layers. Intentionally build edges — areas of transition from plants of one height or type to another — into your garden's architecture. In wild nature, edges are where the greatest diversity of wildlife is found. The structure of most wildlife gardens attempts, on a small scale, to mimic this effect, right down to the herb layer and ground level.

Provide water. The single most important element of any homemade habitat is water. A large ceramic jar tilted on its side, dug into the ground slightly, and filled with water can host damselflies and Pacific tree frogs; moving water attracts all manner of birds. Whether it's a birdbath or a six-by-six pond with a small waterfall, a consistent source of water will invite and help many kinds of wildlife to survive in your yard.

Get down to specifics. Who have you gotten to know in your yard and who are you hoping to attract? Put in what they need and like. Pineapple sage or California fuchsia for Anna's hummingbirds. Buckwheats for the acmon blue. Downed wood and moist soil for the slender salamander. If you create habitat, be assured, they will come.

Dealing with Unwanted Wildlife (Including Mosquitoes)

Some people are concerned that if we garden for wildlife, we may attract animals we don't want in our yards. In addition, with the arrival of West Nile Virus in California, many gardeners worry that water features will attract mosquitoes. According to the National Wildlife Federation, "having a Backyard Wildlife Habitat site does not put you at a higher risk of catching West Nile virus if you follow these basic suggestions:

- Protect yourself by taking simple precautionary measures, such as avoiding peak times of mosquito activity, using insect repellent, and wearing long pants and sleeves."
- Help control sources of mosquito breeding by cleaning gutters each year and regularly draining flower pots, wading pools, and other objects that collect water in your back yard. Change the water in bird baths, wildlife water sources, and pet dishes frequently."
- Where mosquito outbreaks are not controllable, careful management of mosquito breeding sites through limited use of natural larvicides should be considered. Adulticides should not be used."

As far as other animals are concerned, few if any will become a nuisance. If they do, it's because your yard or home has got something they want — a warm dry place to raise young, perhaps, or an easy source of food. To deal with such problems, use basic principles of Integrated Pest Management. Identify what's attracting them and remove it or address the issue.

Bay-Friendly Gardening is flexible.

There's no one style or right way to go about it. In this chapter a few different approaches to gardening are discussed, including gardening as a renter, community gardening, container gardening and hiring a landscaper.

Breaking Ground

If you are a renter and your landlord is open to letting you garden, then dig right in. Here are a few words of advice.

Keep the lines of communication open. Even if your landlord is a bit laissez-faire, keep him or her informed about what you're up to. Invite him to come by from time to time to see what the place looks like. If she likes what you're doing, you may be able to negotiate a reduction in rent or reimbursement for the cost of plants. At the very least, you'll prevent any misunderstandings.

Grow annuals. It's easy to sneak a few annuals into most garden beds and foundation plantings and, since they'll bloom and die in a single year, you can return the garden to its prior state, leaving no lasting traces of your activity.

Put in perennials that you can take out again. All bulbs, corms, and rhizomes — such as iris, gladiolas, and the like — are good bets for the renter, since they divide easily and travel well. Plants like yarrow, which have matting, fleshy root systems, are also easy to put in and take out as required by circumstance.

Moving the Ground Around

Growing plants in pots is a great option for renters — so good, in fact, that it gets a separate section. (See page 77.)

Finding Common Ground

The late Karl Linn, a Berkeley resident who founded community gardens across the US, made the argument that community gardens are more than gardens — they are neighborhood commons. The commons, Linn said are the "shared natural environments" of air, water, and land. Both community gardens and community restoration sites offer all people access to these fundamental elements.

Sign up for a plot at a community garden. As a renter, you have the freedom to at least consider moving close to a community garden. Turnover can be fairly quick, so it's possible to get a plot within six months to a year. To find the one closest to you, surf the Web or call your town's Parks and Recreation Department.

Start a community garden. The web site of the American Community Gardening Association warns that starting a community garden is not a quick process, but it can be done. Linn said "start with the land bank of the city" — work with a public agency that administers land. "It is never secure," he said, "to start a garden on private land. Then form a group that wants to create and use the garden. Either they come to you, or you can attract them by drawing attention to the land."

Carole Bennett-Simmons, one of the founders of Peralta Community Garden in north Berkeley, says it's good to start a garden next to a place where people don't have land. Apartment dwellers, she says, are "automatic customers." Beyond that, she suggests looking for a place with a nice open sky.

Help care for a school garden. Many schools have or would like to start a garden, and all of them are likely to welcome help. Put out feelers at the school nearest to your home, or talk to teachers you know.

Join a community stewardship group. In spite of so much urban development, the East Bay has a surprising number of wild nooks and crannies, and an ever-increasing number of people are joining together to care for them. There are 20 creek groups in Alameda and Contra Costa County, for example, and each one of them offers opportunities to pull weeds, grow seeds, and plant plants. Many parks have "Friends" groups that would welcome your inquiries; some high schools have environmental clubs that might provide a way for you to connect with nature and with other people. The benefits of participating in the activities of such groups are many; the results can truly change your life.

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Container Gardening

Whether you live in an apartment or have a big backyard, containers offer great versatility. Plants can be moved from place to place, and the gardener can compose ever-changing tableaus of color, placement, and seasonality. The downside of containers is that you can't neglect them for too long without dire consequences. Don Mahoney, horticulture manager for the Strybing Arboretum Society in San Francisco, has the following advice for container gardeners.

Container gardening doesn't have to be a short-term proposition. Bonsai trees, the ultimate container plant, can live for 400 years. Manzanitas can be grown in pots for a dozen years or more. Instead of this year's impatiens, grow longer-lived plants in containers, ones that will last at least a few years.

Soil and water should be seen as a team. In a hot area, inland, you'll have to water more — or use a heavier soil mix. In the fog belts of San Francisco and Berkeley, where there's so much moisture in the air, a mix that has more sand or perlite will be required. Gardeners who water their container plants often will also want a soil mix that drains well. If you want to conserve water, it's perfectly easy to do so; use a heavier soil in the mix — you can even include a bit of garden clay — or use very drought-tolerant plants, such as succulents.

Start with the right soil mix. The best potting soil is not one brand but the right mix of ingredients for your location, your watering habits, and the plants you want to grow. You will need a component that ensures good drainage — such as sand — and an element that will hold moisture, such as compost. For commercial mixes, many gardeners recommend Gardner & Bloome, produced by Kellogg Garden Products. Edna's Best by E. B. Stone is also popular.

Plant singly. Mahoney keeps a lot of his treasure plants alone in a pot, so he can keep an eye on them. Caring for these individuals is easy, as each plant can be matched to the appropriate soil, sun, and watering regime.

Or plant in combination. For that filled in and bountiful look, put a lot of plants in a single pot.

When you do this, make sure all the plants take the same culture. One approach is to sort the plants by their place of origin. Mahoney has containers of all South African plants, all California

Tip: Water Containers with Care

Artist and garden consultant Sarah Ginskey has several beautiful container plantings that feature low-maintenance succulents and grasses. She says she applies the same principles to watering her pots as she does the rest of her garden. "You have to pay attention to sun and moisture, and to how well you water — is the soil compacted? Is the water percolating?"

natives, and a grouping of "true Mediterraneans" — rosemary, lavender, and thyme.

Have fun with the combinations. Mix and match summer plants. Play with combinations of deciduous and evergreen. Mahoney has a Japanese maple in a pot that's underplanted with California polypody (a native fern). In the fall and winter, when the maple is bare, the fern grows up and fills in the picture. In the summer, when the tree leafs out, the fern goes dormant. Similarly, Mahoney raises a lot of California wildflowers from seed and each spring transplants them into pots that are also home to more permanent woody species.

Keep your container plants happy year after year. After two or three years, add three to four inches more soil to the top of the pot or, better yet, to the bottom. Amend pots with a couple handfuls of homemade compost before the rainy season begins each year, and the rain will work the nutrients down into the soil.

Hiring Help

While creating and maintaining your own garden can be a satisfying experience, hiring help is sometimes also appropriate, and even necessary. Whether you want to hire a professional for help with design or are considering a landscaping company for regular maintenance, look for a landscaper whose practices are compatible with Bay-Friendly principles.

How a landscape professional manages your yard and garden — from using pesticides to choosing plants — has an impact on your garden, our natural resources and the San Francisco Bay watershed. Urban runoff carries pesticides, sediment, and fertilizer into storm drains, which lead to our creeks, waterways and eventually the Bay. Choosing a landscape professional who uses Bay-Friendly practices can eliminate or minimize these hazards.

Tip: Add Worm Castings to the Mix

Topdress your container plants with worm castings — this balanced, nutrient-rich amendment will really give your potted plants something to grow on. Unlike other fresh manures, worm castings will not burn plants. They are also rich in beneficial organisms, so, when adding worm castings to potting soil, you are inoculating the soil with new life.

As more homeowners are interested in creating gardens that mimic natural systems, it stands to reason that more landscapers will offer complementary services. Here are a few tips for finding a landscape professional who fits your needs:

- Consider hiring a Bay-Friendly Qualified Landscape Professional. Qualified landscape professionals have completed a comprehensive training program, including passing an exam. Equipped with the know-how, these maintenance professionals are enthusiastic about offering a holistic approach to the management of your landscape. A list of professionals who have participated in this program can be found at www.BayFriendly.org/BF-qualified.

- Visit professionally designed or maintained gardens on the spring Bay-Friendly Garden Tour. Featured residential gardens showcase natural gardening techniques and provide real-life models of what Bay-Friendly offers. A list of landscapers whose client gardens have been included on this tour can be found at www.BayFriendly.org/designer.

StopWaste.Org's Bay-Friendly Landscaping Program also provides other resources, including Bay-Friendly Landscape Guidelines, for professionals. Encourage professional landscapers to visit www.BayFriendly.org or call (510) 444-SOIL for more information.

Books

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Web Resources

Visit *www.BayFriendly.org* for more on-line resources to help with your Bay-Friendly garden.

Biocontrol Network. *www.bioconet.com.* Information on insect identification, insect biology, organic farm and garden products, and educational materials.

CalFlora: Botanical Resource for California. *www.calflora.org.* This online database allows you to call up pictures and information on hundreds of native and naturalized California plants.

Mediterranean Garden Society. *www.mediterraneangardensociety.org.* A membership organization "devoted to furthering knowledge and appreciation of plants and gardens suited to the Mediterranean climate regions of the world." Web site links to a Mediterranean climate discussion group.

National Wildlife Federation. *www.nwf.org.* A starting place for information about backyard habitat gardening.

UC Integrated Pest Management. *www.ipm.ucdavis.edu.* Photos of insects, weeds, and other pests with detailed information about their ecology and natural enemies.

Local and Statewide Organizations

Alameda County Water District (ACWD) is committed to running cost effective and beneficial conservation programming to help ensure a high quality water supply as well as enhance the quality of our environment.
(510) 668-4200 *www.acwd.org*

Alameda Countywide Clean Water Program (ACCWP) is a consortium of local agencies working to educate residents, businesses, and employees about stormwater pollution to restore the health of local watersheds, creeks, and the San Francisco Bay. (510) 670-5543 *www.cleanwaterprogram.com*

The **Bio-Integral Resource Center** has specialized in IPM research and education for 25 years. This nonprofit organization publishes two useful and user-friendly journals for members and also makes available pamphlets and fact sheets on a variety of IPM-related topics. (510) 524-2567 *www.birc.org*

The **California Invasive Plant Council** works to protect California wildlands from invasive plants through research, restoration, and education. Holds an annual symposium, publishes books and other educational materials, and occasional workshops. (510) 843-3902 *www.cal-ipc.org*

The **California Native Plant Society** has both statewide and local programs. The East Bay chapter offers field trips, restoration work parties, plant propagation programs, and a monthly newsletter. (510) 464-4977 *www.ebcnps.org*

Contra Costa County offers free composting and vermicomposting workshops, instructional composting video loan, and reduced price compost bins in most areas of the County. Contra Costa County Recycling Hotline: 1-800-750-4096 *www.cccrecycle.org/compost* **Central and South County:** Central Contra Costa Solid Waste Authority. (925)906-1806 *www.wastediversion.org* **West County:** West Contra Costa Integrated Waste Management Authority. (510) 215-3021 *www.recyclemore.com*

The **Davis Street Station for Material Recycling and Transfer (SMaRT)** in San Leandro is a great source for inexpensive soil products, compost, and mulch made from yard trimmings. (510) 638-2303.

The **East Bay Municipal Utility District (EBMUD)** is a publicly owned utility formed in 1923 and serving portions of Alameda and Contra Costa counties. Their mission is to manage the natural resources with which the District is entrusted; to provide reliable, high-quality water and wastewater services at fair and reasonable rates for the people of the East Bay; and to preserve and protect the environment for future generations. (510) 287-0591 *www.ebmud.com*

The **Ecology Center** in Berkeley offers classes and has a store that carries organic soil amendments, nontoxic pest control products, tools, and books. (510) 548-2220 *www.ecologycenter.org*

Marin County Stormwater Pollution Prevention Program (MCSTOPPP) is a consortium of all Marin municipalities. Working to protect water quality in our creeks and wetlands since 1993, MCSTOPPP offers technical assistance, workshops, and educational materials for the general public — including information on less toxic alternatives to pesticides. (415) 499-6528 *www.mcstoppp.org*

Master Gardeners — Alameda County. **Alameda County Master Gardeners** are volunteers trained by the University of California Extension to help the residents of Alameda County with their gardening questions. Master Gardeners stress research based integrated pest management techniques that can help reduce pesticide and herbicide use in Alameda County homes. Program Information: (510) 639-1275, Plant Doctor Hotline: (510) 639-1371 *www.acmg.ucdavis.edu*

The **Merritt College** Landscape Horticulture department holds a plant sale each spring and fall. (510) 436-2418 *www.merritlandhort.com* The Environmental Studies Program offers classes in Wildlife Gardening, Restoration Landscaping and Ecological Design. (510) 434-3840 *ecomerritt@sbc.global.net*

The **Regional Parks Botanic Garden** at Tilden Park features native plants from throughout the state. Nursery plants are sold April through December, with a large sale held each April. (510) 841-8732 *www.nativeplants.org*

The **City of San Jose** has established a national reputation for environmental leadership and innovation through the programs and services of its Environmental Services Department — ensuring healthy streams, rivers, marshlands, and Bay waters; managing reliable water, garbage and recycling services; developing clean and green air, land and energy policies; and providing community education aimed at environmental sustainability. (408) 535-8500 *www.sanjoseca.gov/esd*

San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) is a partnership of the County and the Cities in San Mateo County focused on protecting and enhancing water quality in creeks, wetlands, the Bay and Pacific Ocean. (650) 363-4305
pollutionprevention@co.sanmateo.ca.us • *www.flowstobay.org*

The **UC Botanical Garden** showcases a large collection of plants from around the world, including Mediterranean-climate areas and California. (510) 643-2755
www.botanicalgarden.berkeley.edu/

City of Vallejo Water Conservation Program provides informational materials and other services to its customers to help them better manage their water usage.
(707) 648-4479 or e-mail *waterinfo@ci.vallejo.ca.us*

The Watershed Project (formerly the Aquatic Outreach Institute) coordinates the work of several community-based groups doing gardening and restoration projects and offers workshops on gardening for wildlife.
(510) 665-3546 *www.thewatershedproject.org*

Garden Design Survey

Survey Your Site

It helps to start by identifying what you have, and then building a design around that. Take a few minutes to think about the possibilities and limitations of your site.

1. What is your general exposure?

   ❑ Full sun ❑ Partial shade ❑ Full shade

2. What type of soil do you have?

   ❑ Clay ❑ Sand ❑ Loam

3. Is there a slope?

   ❑ Gentle ❑ Steep ❑ Flat

4. How does water flow? (For example, are there seasonal wet spots or surface water.)

5. How does the soil drain? Will the existing soil need to be amended with compost to improve drainage?

6. Are there areas to avoid? (For example, underground cables, water and sewer pipes, or contaminated soil.)

7. Are wind breaks needed?

8. Is there existing landscaping?

9. Are there plants and other features that you would like to retain from the existing landscape?

10. Where are water spigots? Is there an existing irrigation system?

11. What kind of garden do you have? (Check all that apply.)

    ❑ Flower ❑ Vegetable ❑ Edible

    ❑ Herb ❑ Fruit ❑ Rock

    ❑ Woodland ❑ Large tree ❑ Collector's plant

    ❑ Wildlife ❑ Butterfly ❑ Hummingbird ❑ Insect-attracting

    ❑ Drought-tolerant ❑ Native plant ❑ Permaculture ❑ Low-maintenance

    ❑ Other

Continued on other side →

A Garden for Your Lifestyle

Function is an important design element that precedes and determines plant selection. So before heading out to the nursery, consider the many functions of your garden.

1. What do you want to do in your garden?

- ❑ Create a children's play area.
- ❑ Entertain and enjoy meals.
- ❑ Grow food.
- ❑ Attract wildlife.
- ❑ Construct a privacy screen.
- ❑ Create a welcoming entrance.
- ❑ Add color.
- ❑ Add interest to front of house.
- ❑ Make a utility area.
- ❑ Feature garden art.
- ❑ Create a quiet sitting area.
- ❑ Include room for pets.
- ❑ Other
- ❑ Other

2. What kind of outdoor structures and features do you want to include?

- ❑ Benches
- ❑ Barbeque
- ❑ Children's play structure
- ❑ Birdbath
- ❑ Fountain
- ❑ Pond
- ❑ Outdoor furniture
- ❑ Greenhouse
- ❑ Potting bench
- ❑ Deck
- ❑ Patio
- ❑ Storage shed
- ❑ Fence
- ❑ Trellis
- ❑ Gazebo
- ❑ Garden art
- ❑ Outdoor lighting
- ❑ Other

3. What kind of garden do you want?

- ❑ Flower
- ❑ Vegetable
- ❑ Edible
- ❑ Herb
- ❑ Fruit
- ❑ Rock
- ❑ Woodland
- ❑ Large tree
- ❑ Collector's plant
- ❑ Wildlife
- ❑ Butterfly
- ❑ Hummingbird
- ❑ Insect-attracting
- ❑ Drought-tolerant
- ❑ Native plant
- ❑ Permaculture
- ❑ Low-maintenance
- ❑ Other

4. How much time do you currently spend gardening (per month)?

5. How much time do you want to spend gardening?